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**Harper**

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(54) **POST AND PANEL CONSTRUCTION**

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17, 2010.

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**E04B 2/702** (2013.01); **E04C 3/12** (2013.01)  
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52/838; 446/106

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E04B 2/707; E04B 2/708; E04B 5/12; E04B  
2002/023; E04B 2002/0204; E04B 2002/0217;  
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E04C 3/12; E04C 3/14; E04C 3/30

USPC ..... 52/233, 761, 775, 777-780, 267, 270,  
52/280, 282.1, 838, 204.6, 716.8; 446/106  
See application file for complete search history.

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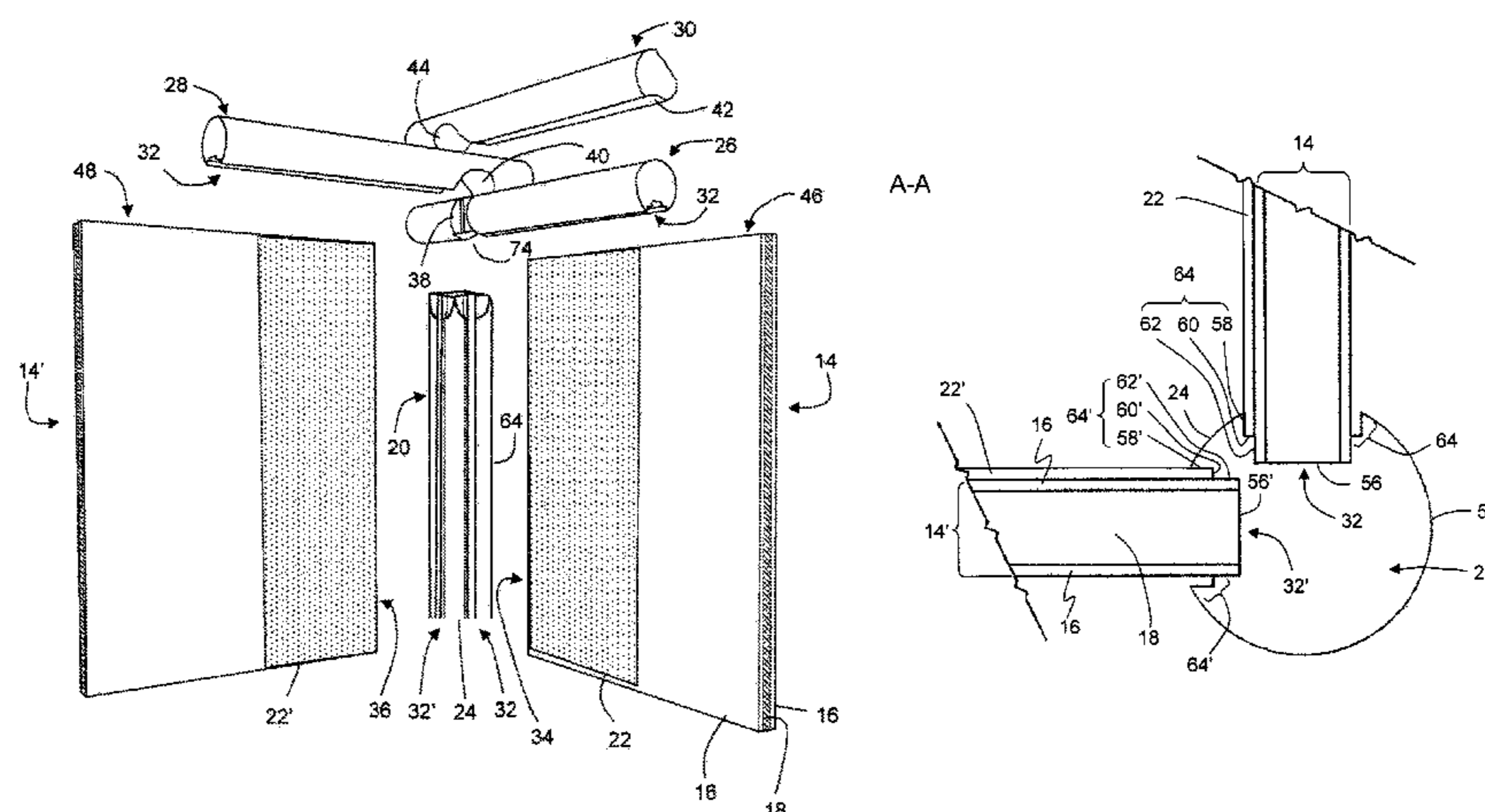
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LLP; Wilfred P. So; Sheldon Burshtein

(57) **ABSTRACT**

An assembly for integrating an elongate structural member  
such as a post or a beam, and one or more panels is provided.  
The elongate structural member includes a notch defined  
within the elongate structural member. The notch includes a  
base surface and two side surfaces at opposite ends of the base  
surface. At least one of the side surfaces is tiered, with the  
tiered side surface including an inner portion and an outer  
portion that are substantially parallel to each other. The inner  
portion is substantially perpendicular and is adjacent to the  
base surface. The outer portion is offset from the inner portion  
and is positioned further away from the other side surface  
compared to the inner portion. A first panel is positioned  
within the notch and in contact with at least the base surface  
and the inner portion of the tiered surface. A second panel  
may also be positioned within the notch.

**44 Claims, 12 Drawing Sheets**



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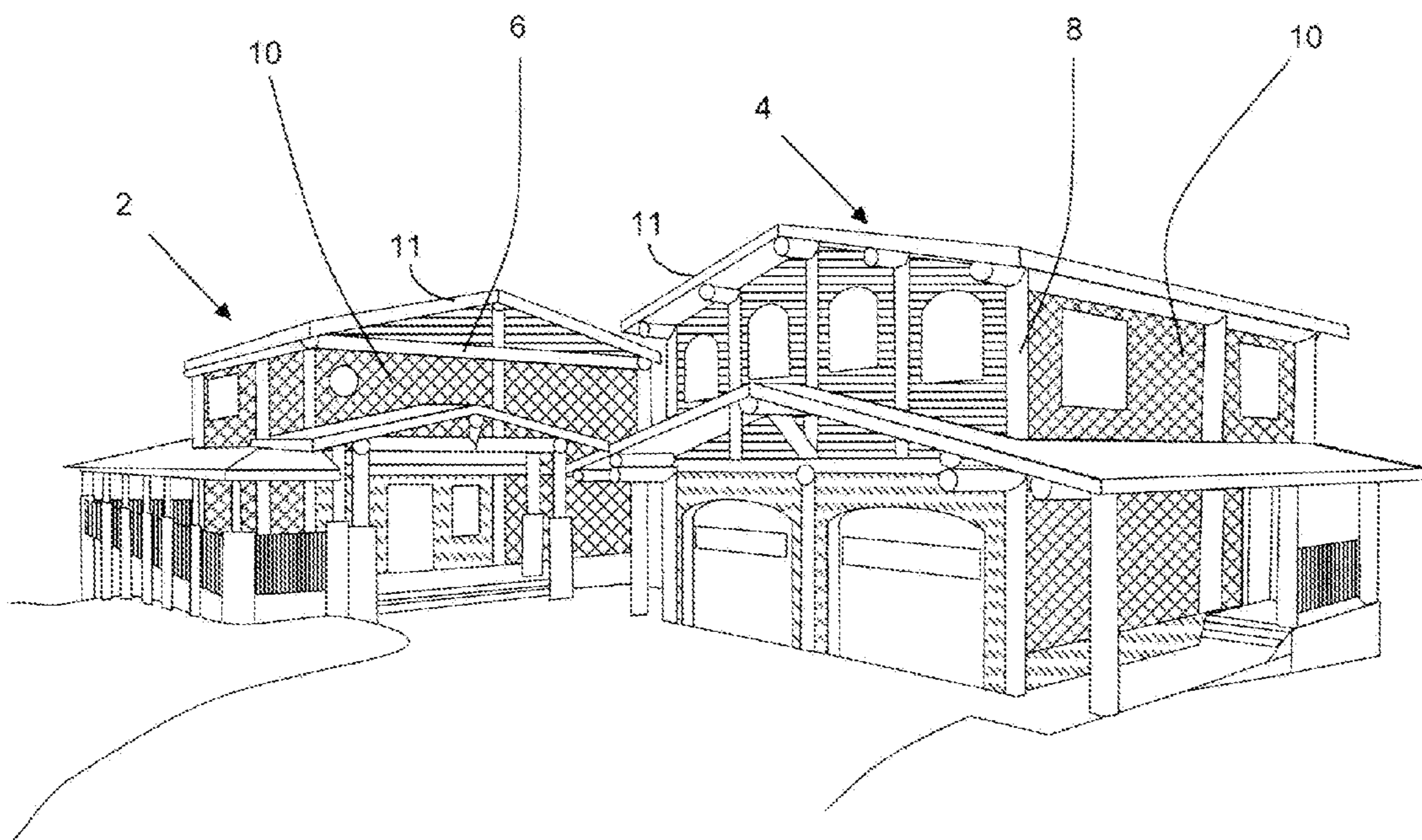
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Example



**FIG. 1**

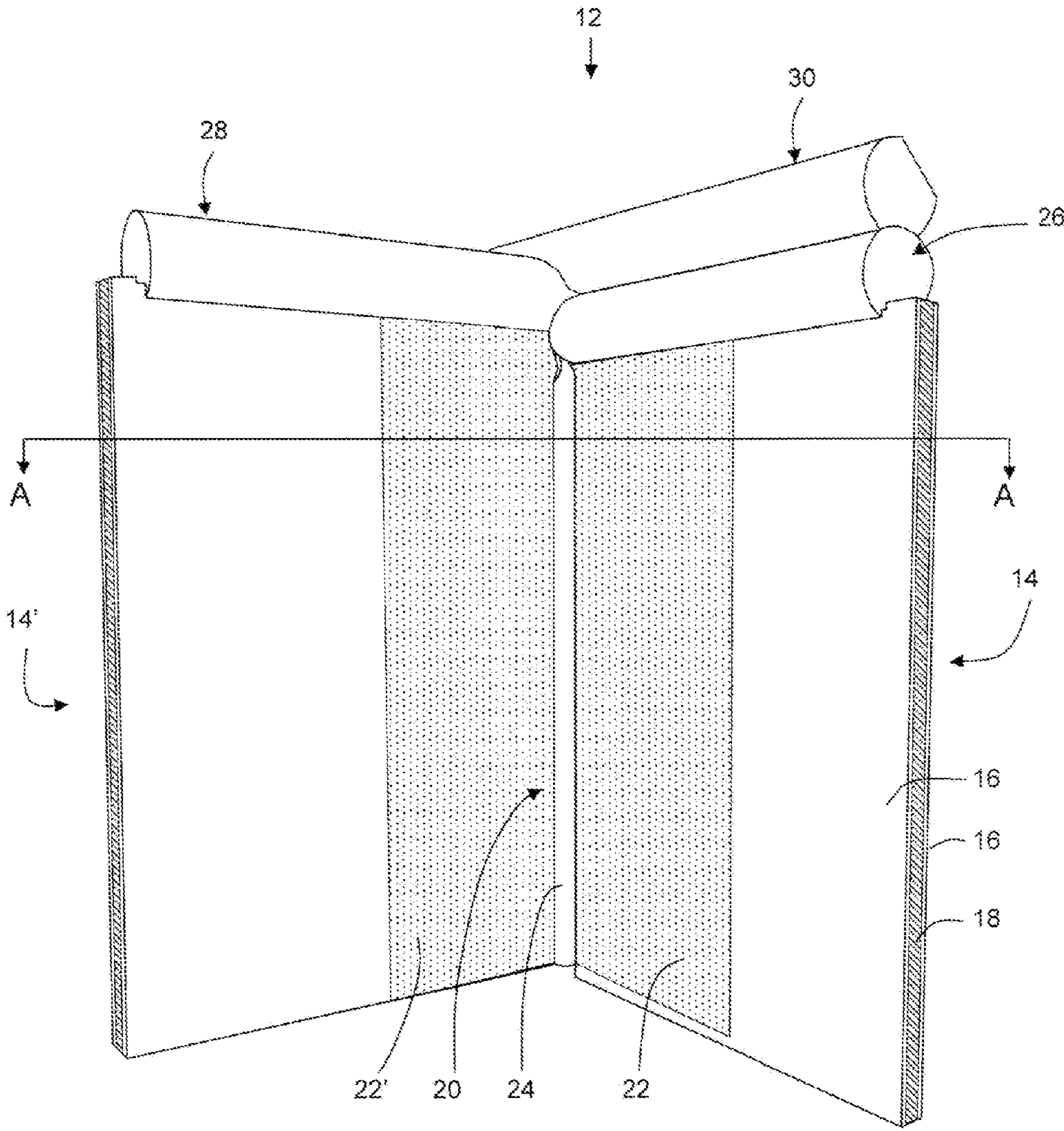


FIG. 2

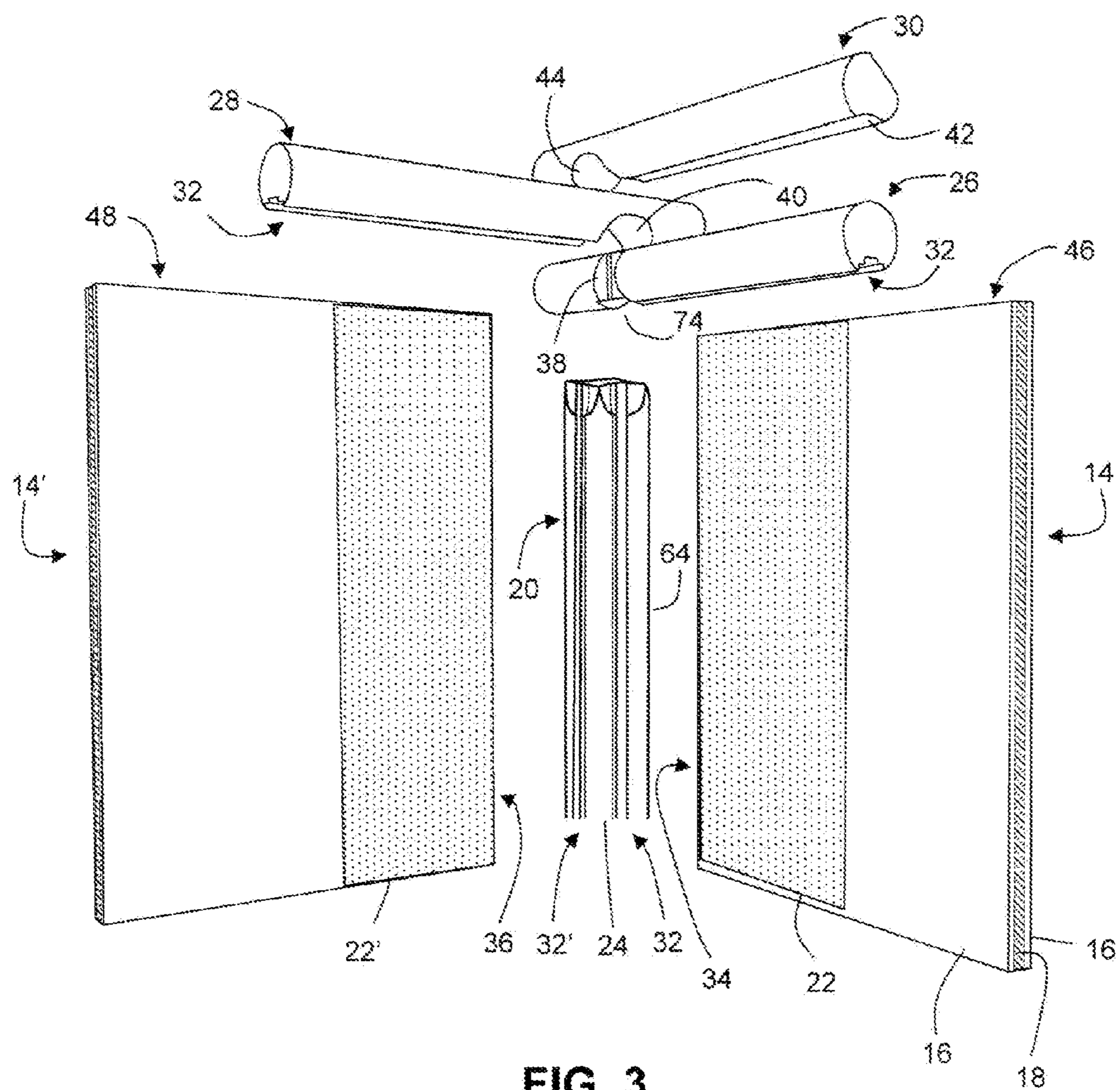
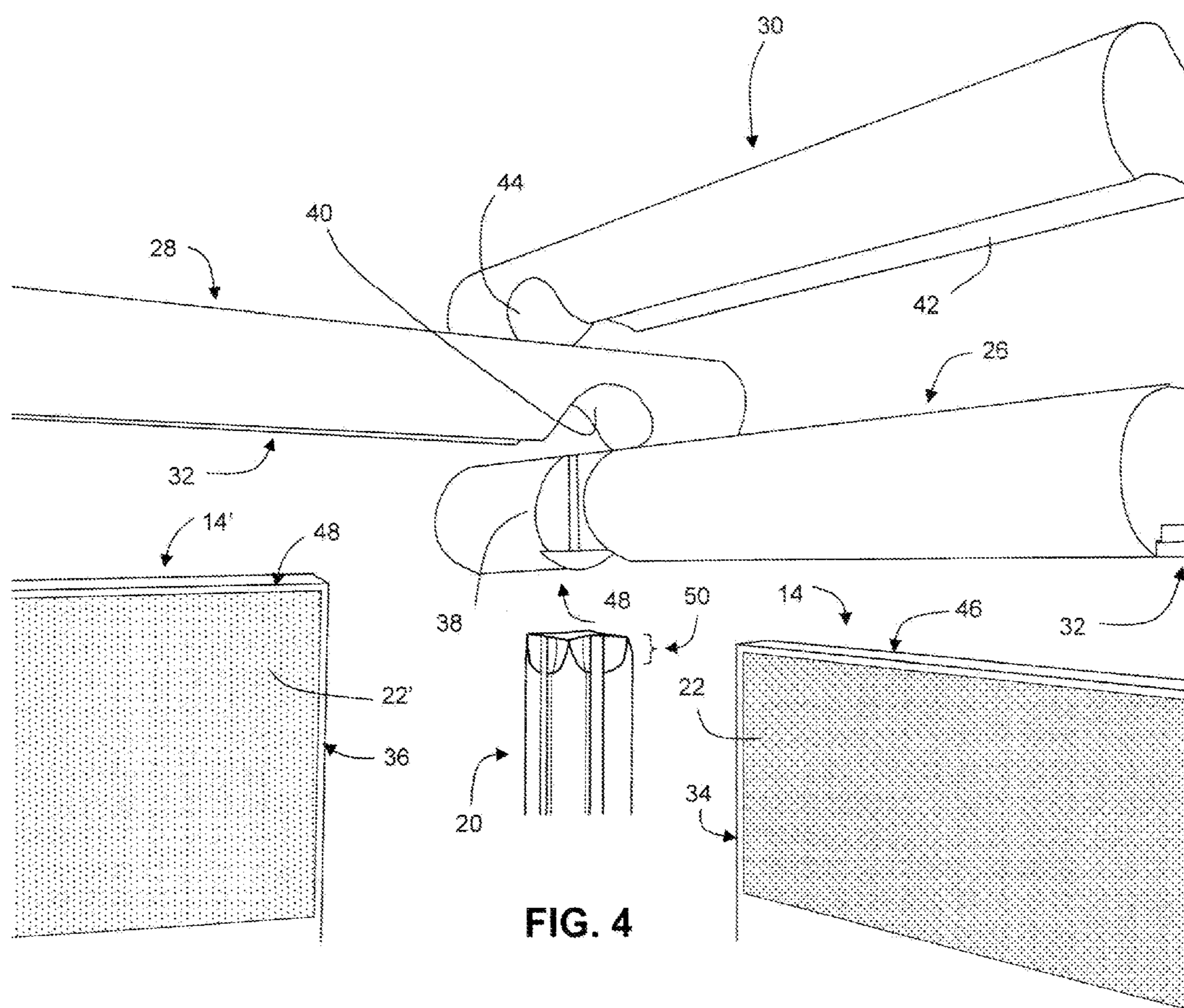


FIG. 3



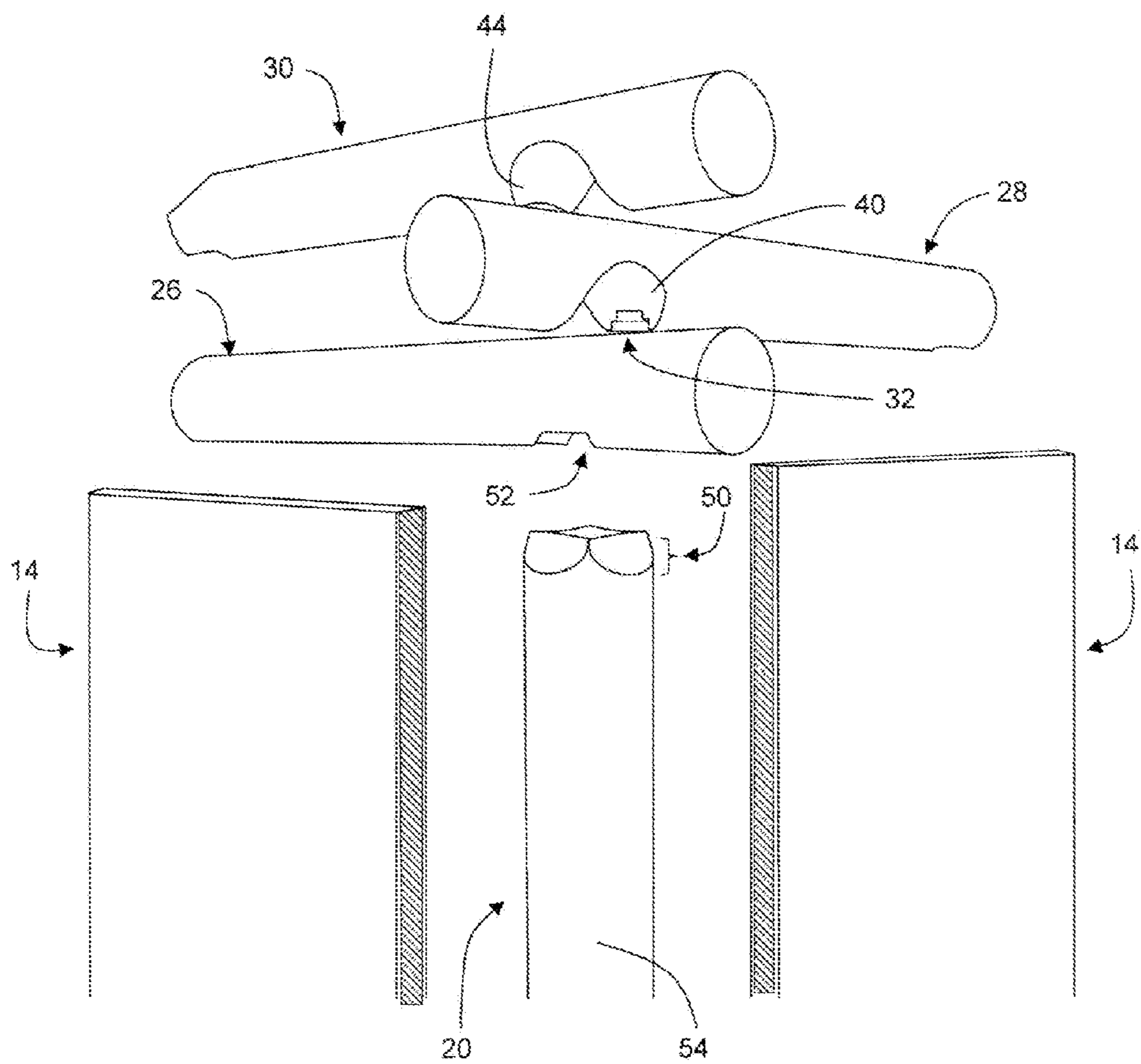


FIG. 5

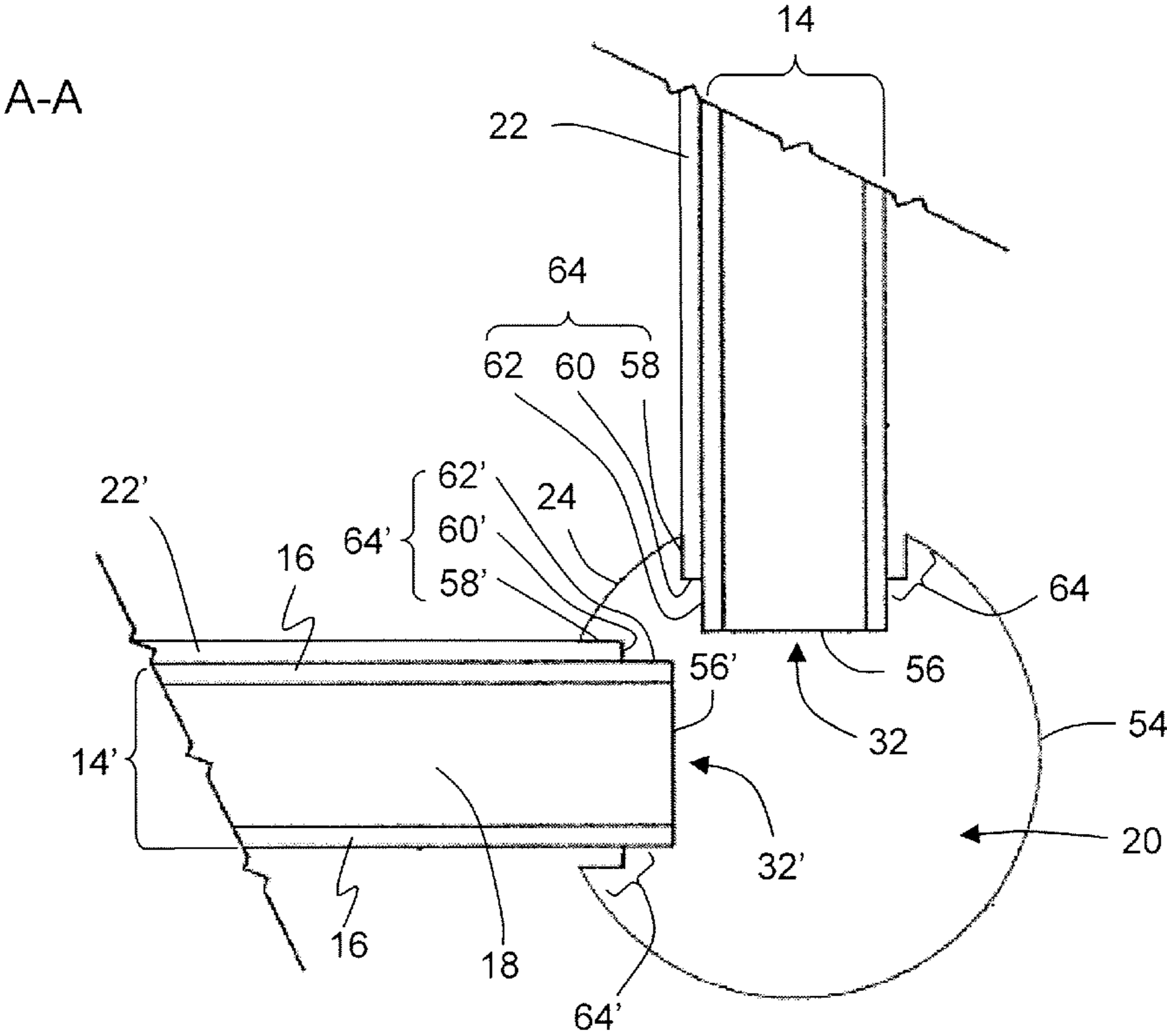
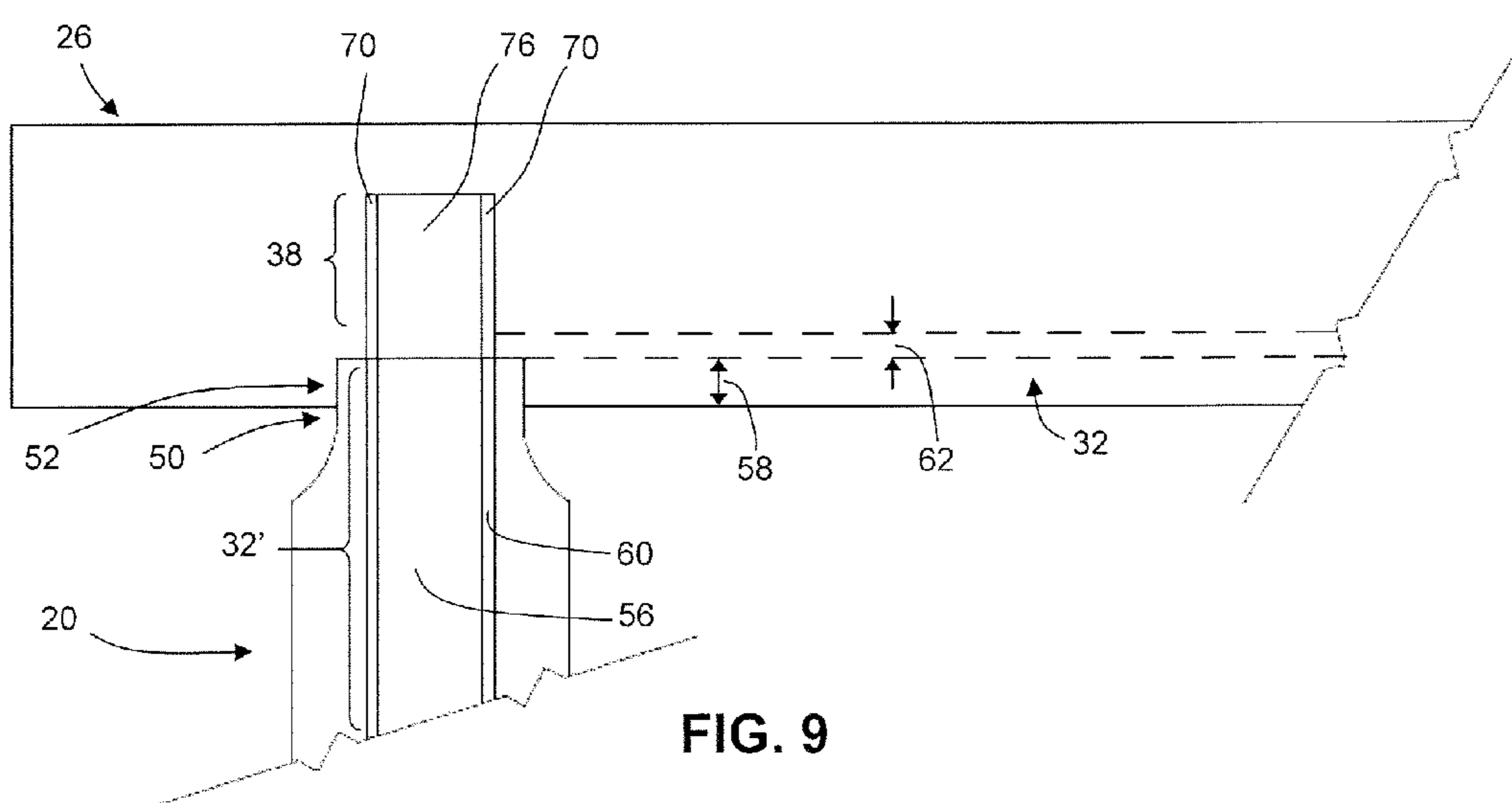
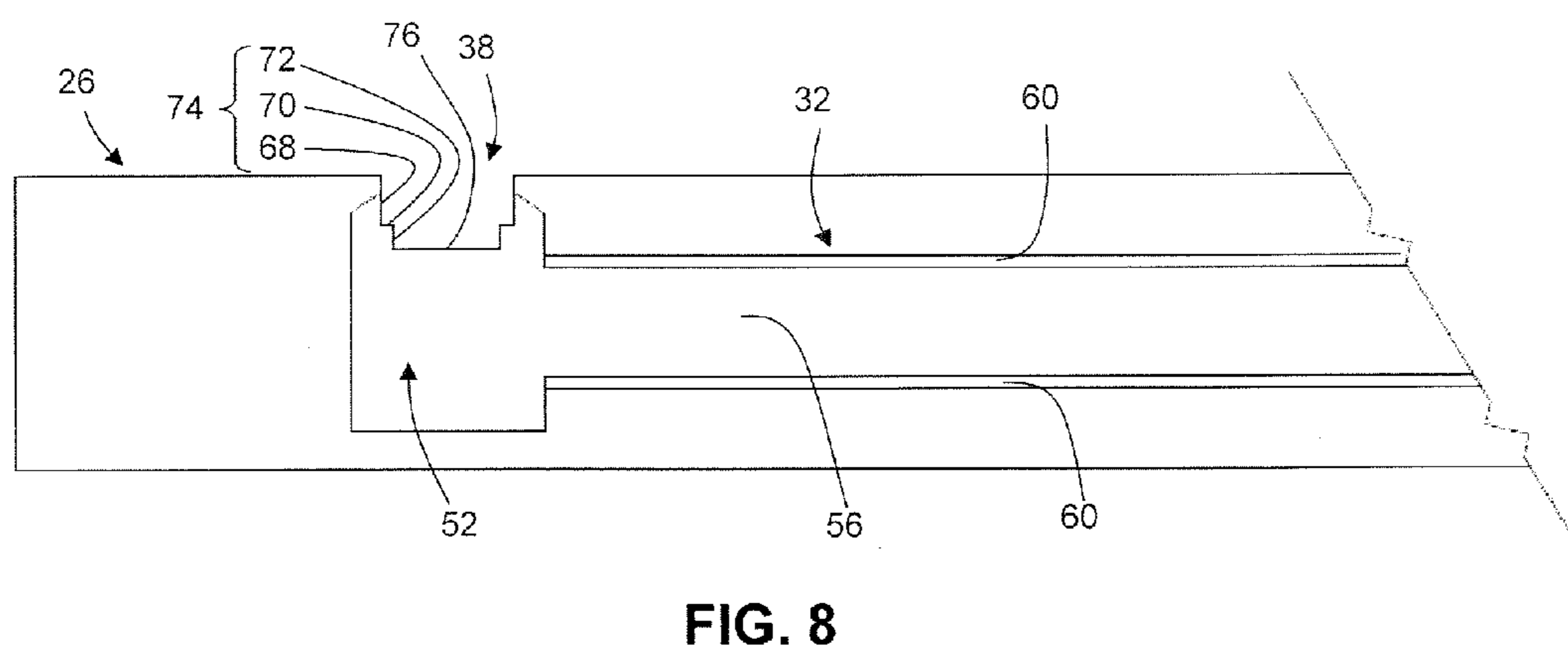
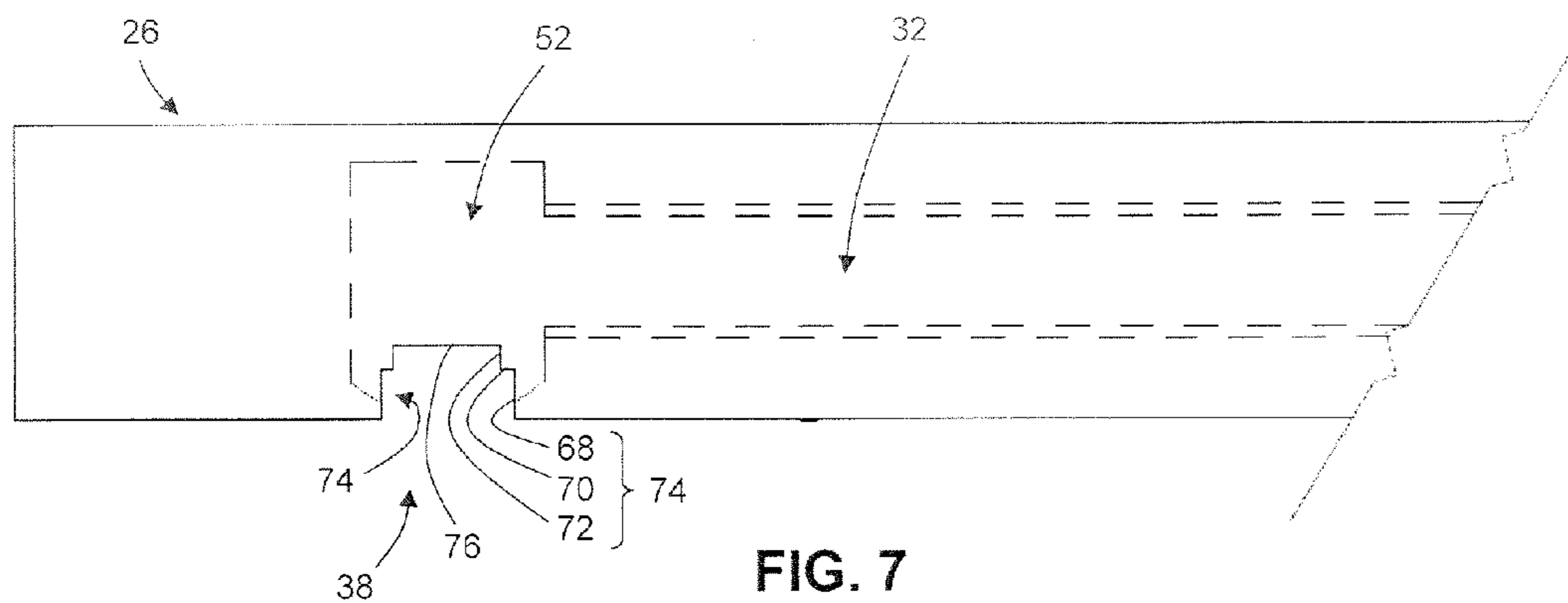


FIG. 6



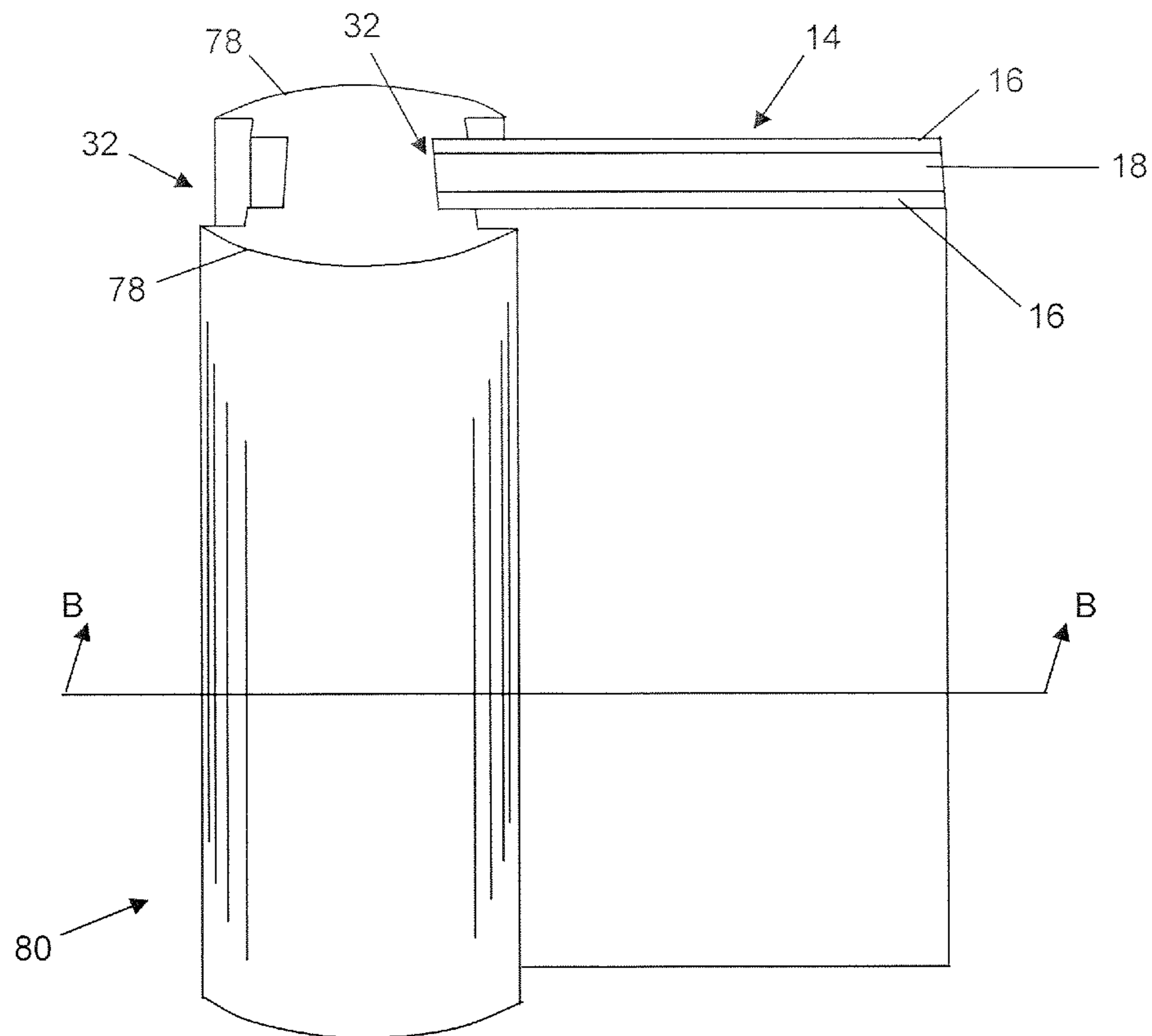


FIG. 10

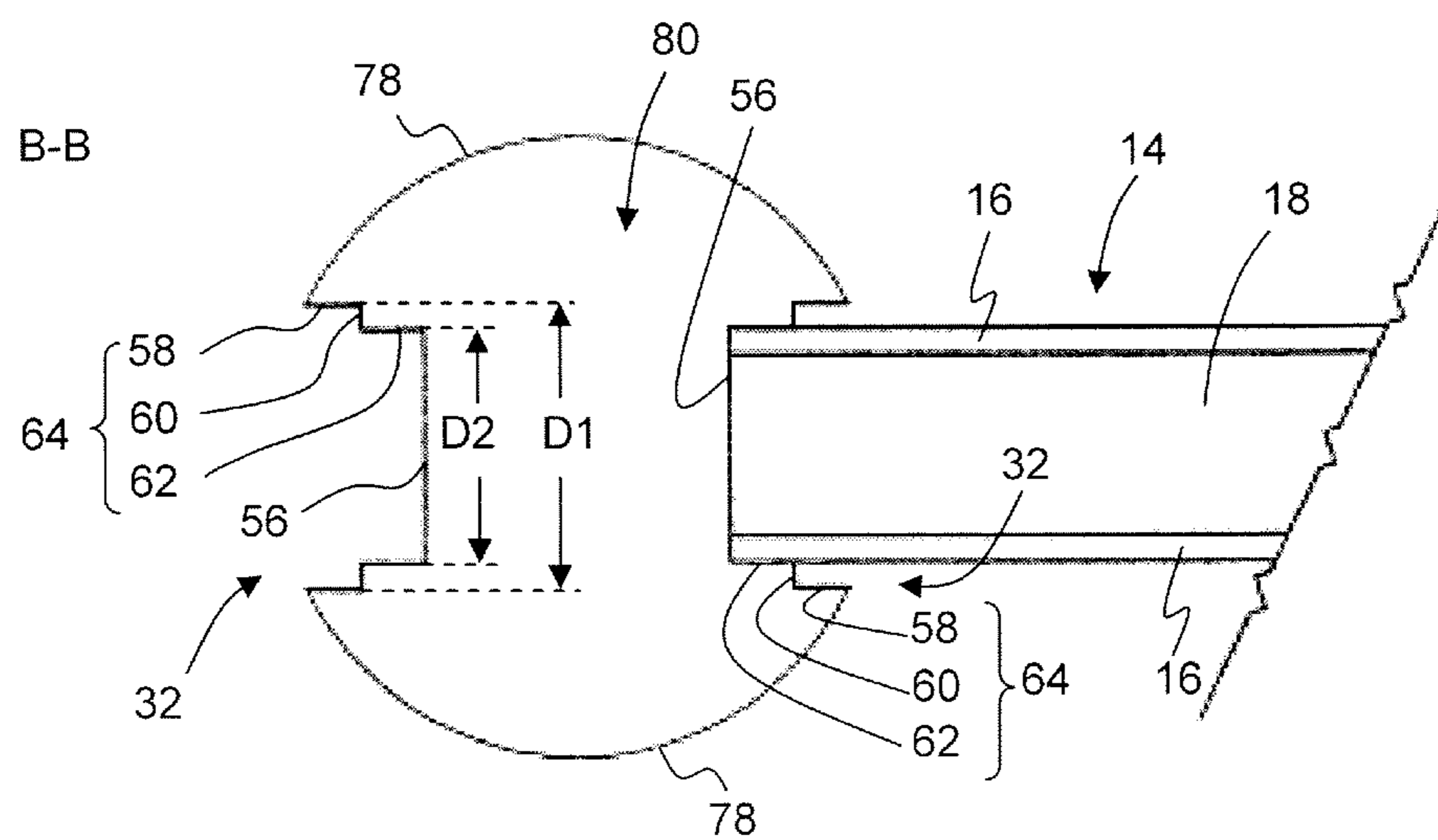


FIG. 11

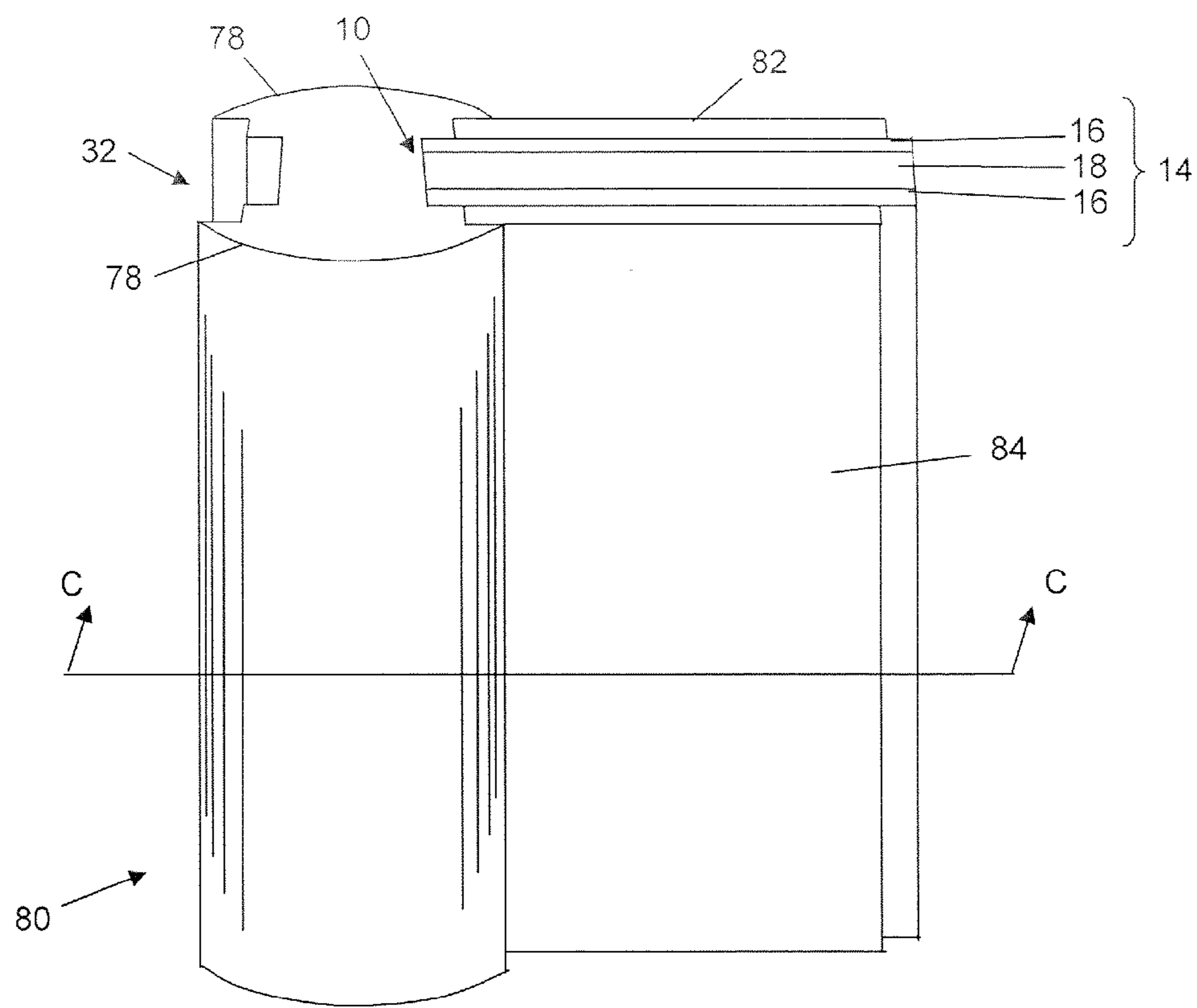


FIG. 12

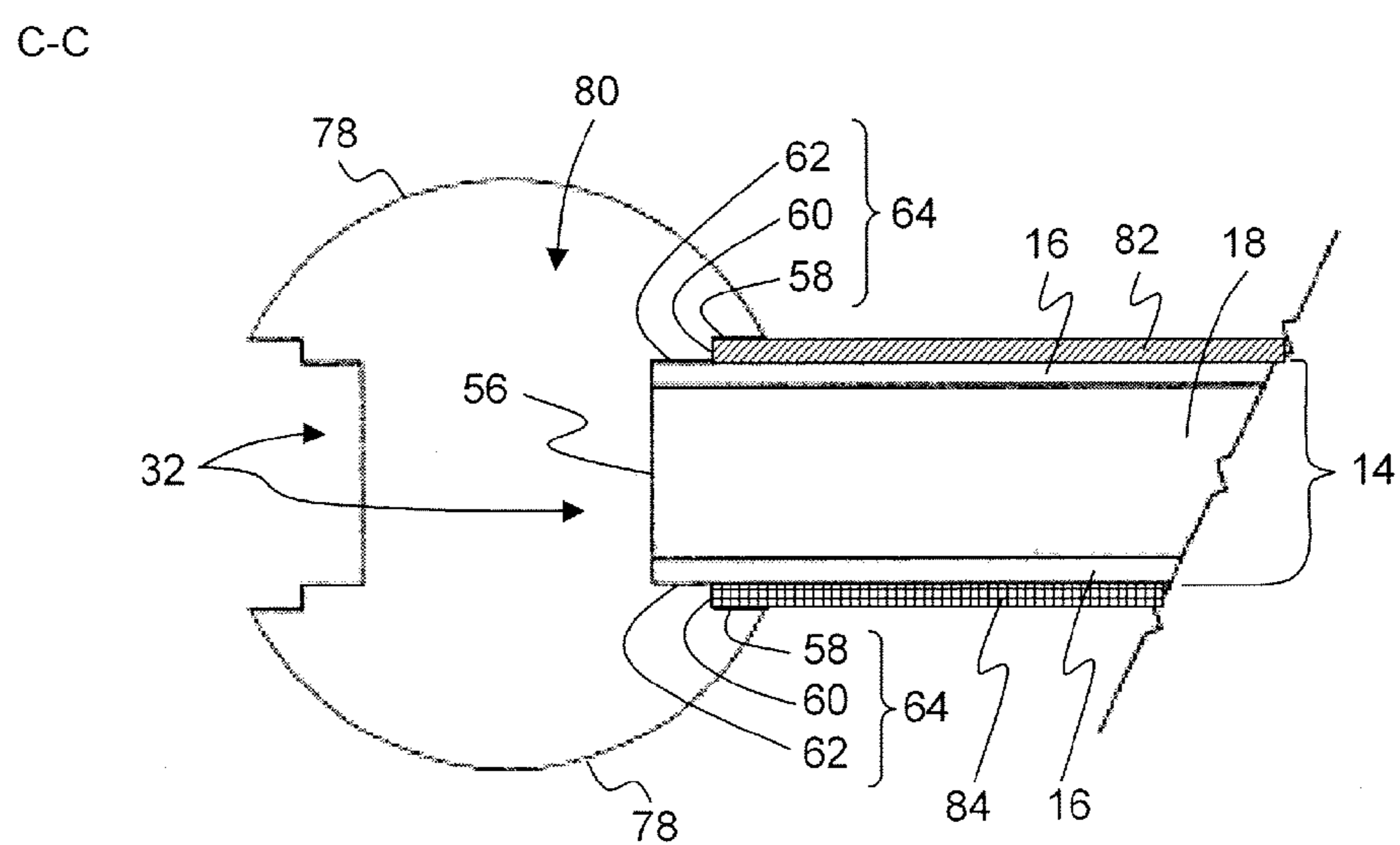


FIG. 13

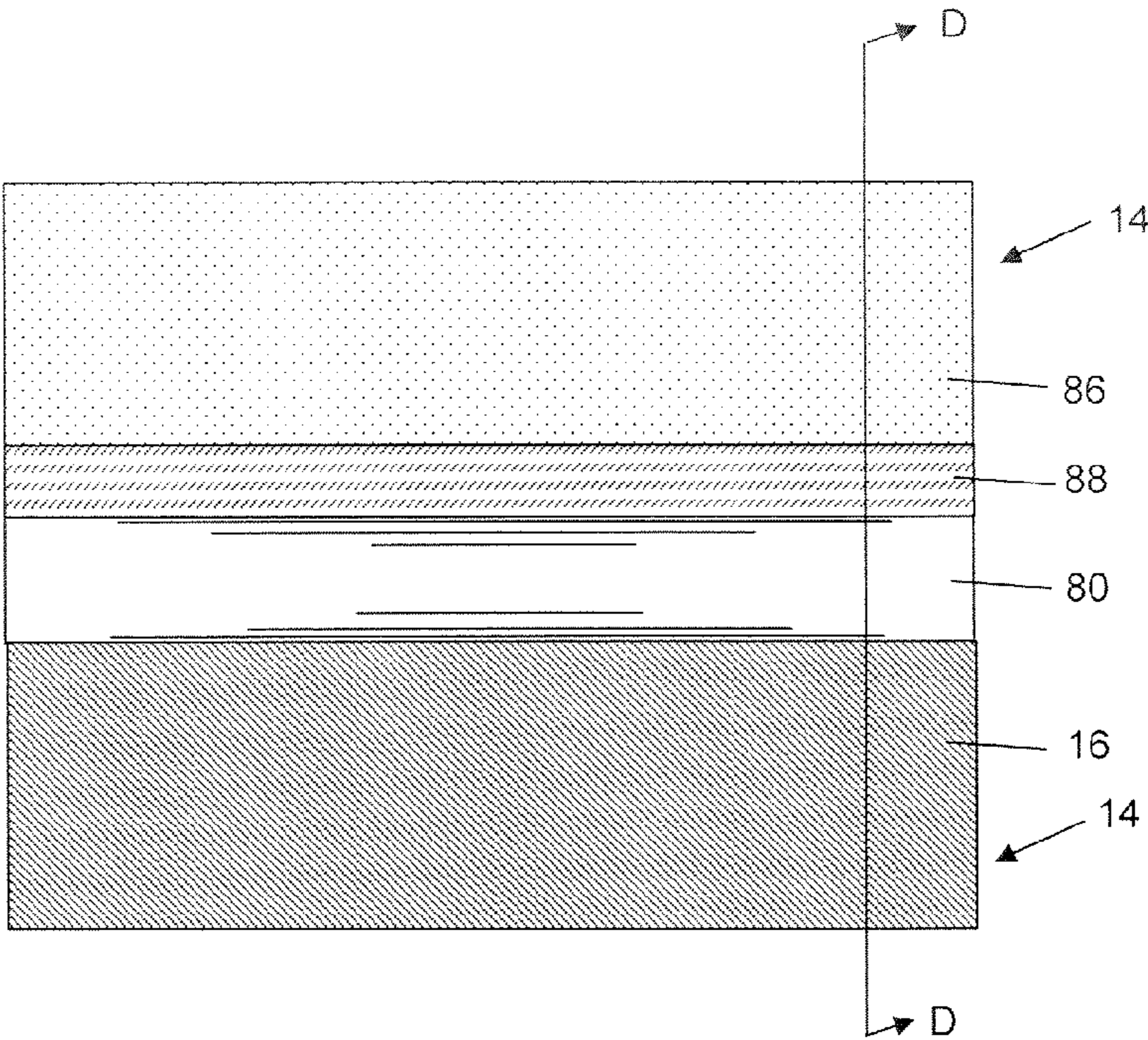


FIG. 14

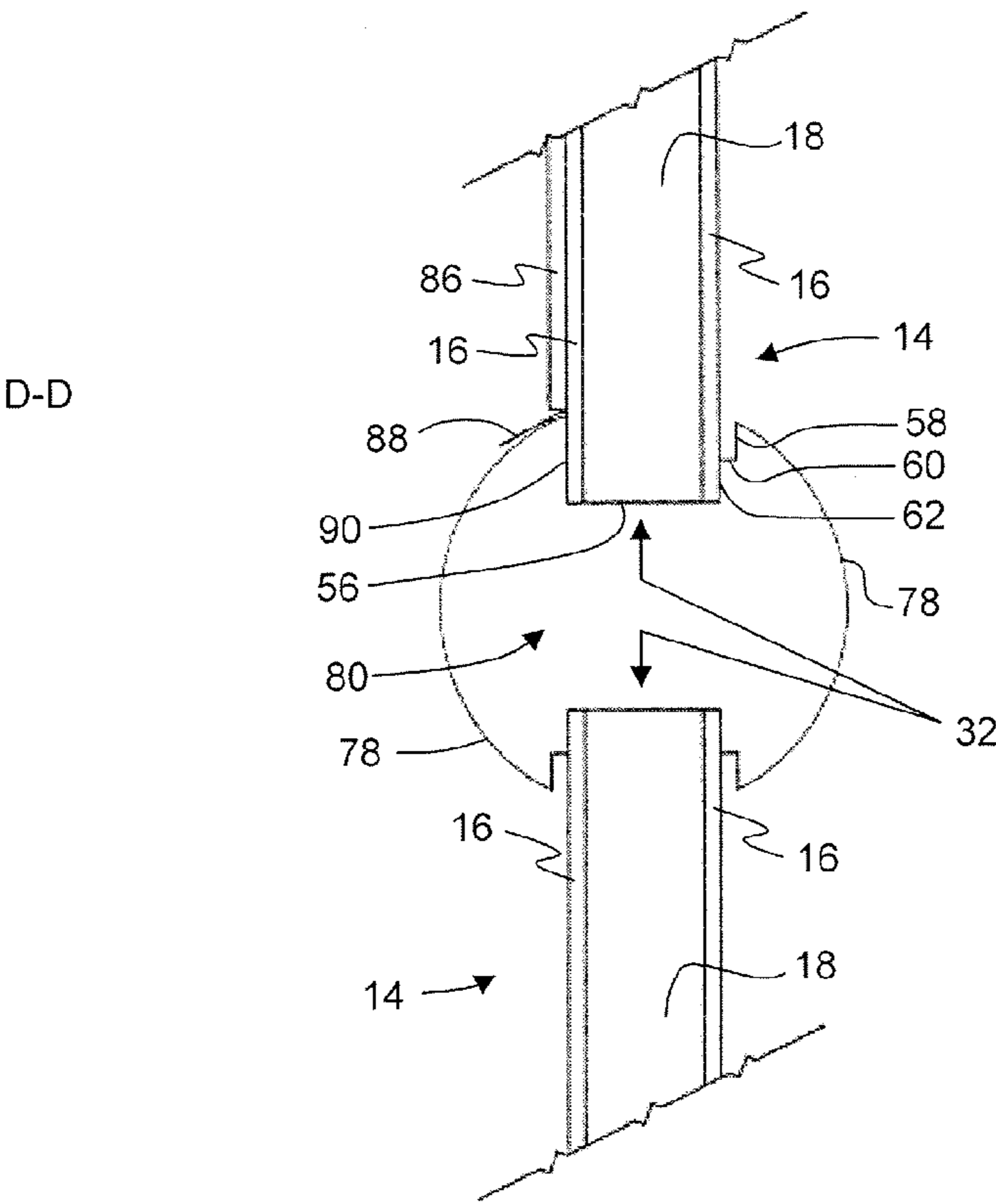


FIG. 15

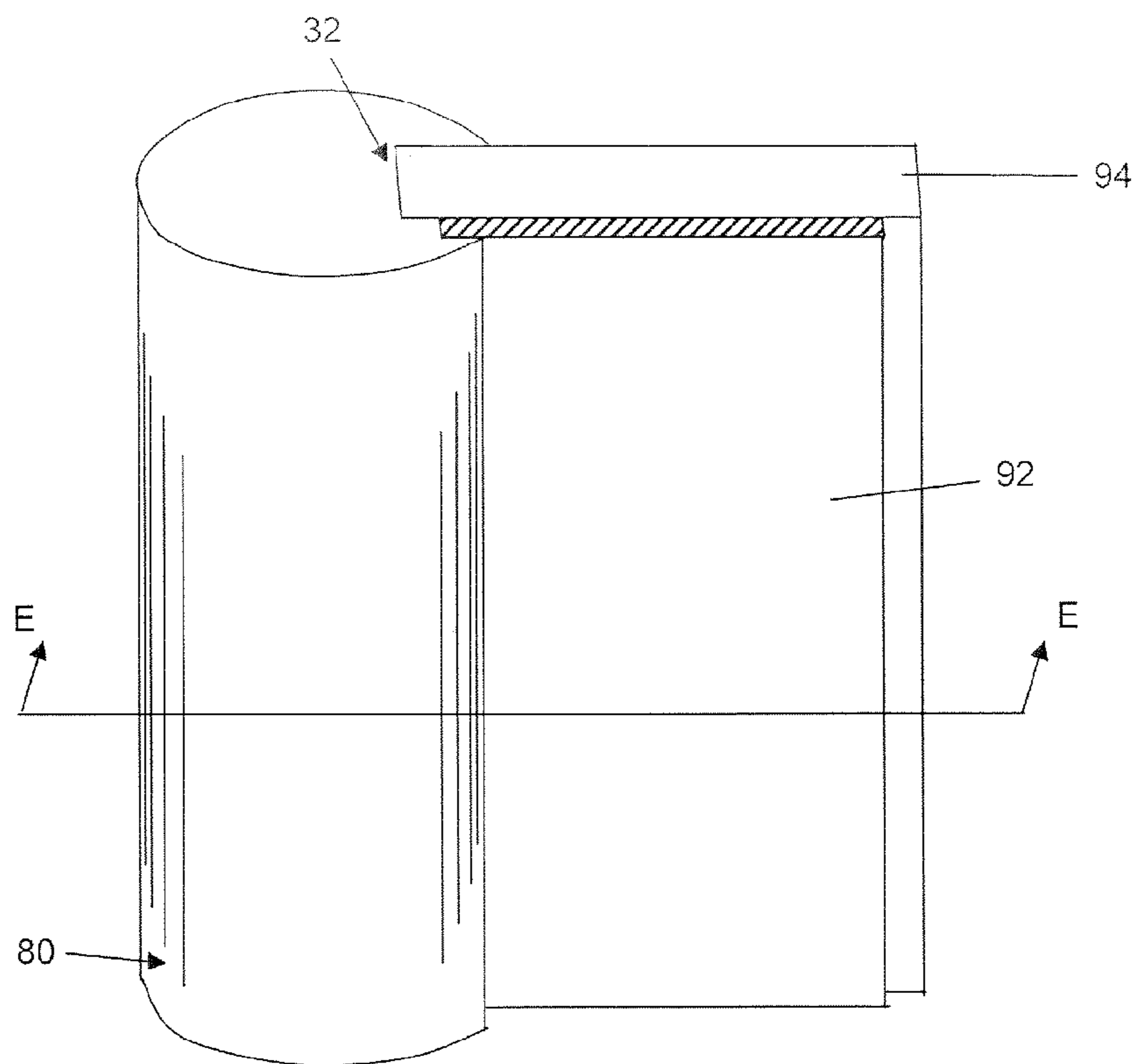


FIG. 16

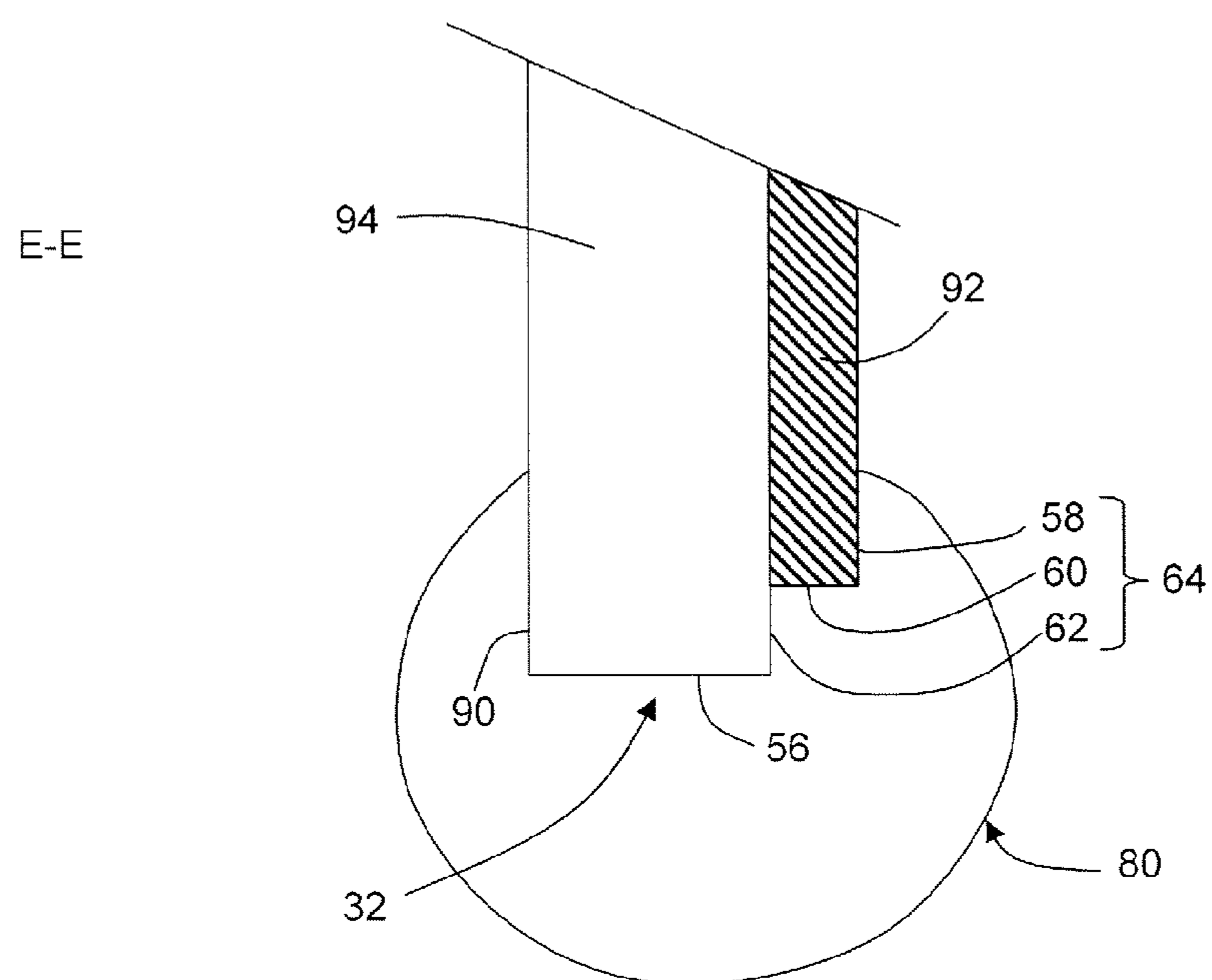


FIG. 17

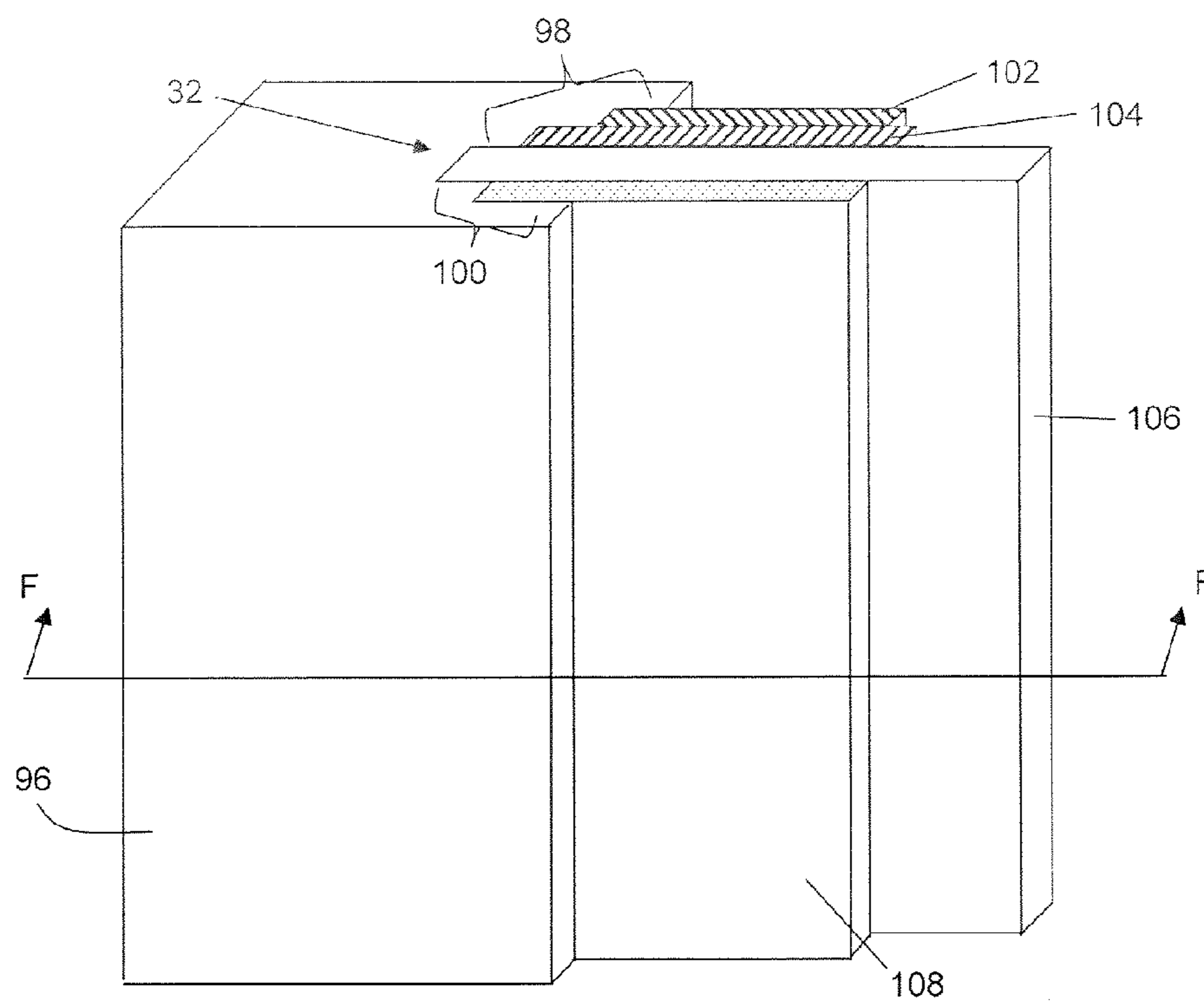


FIG. 18

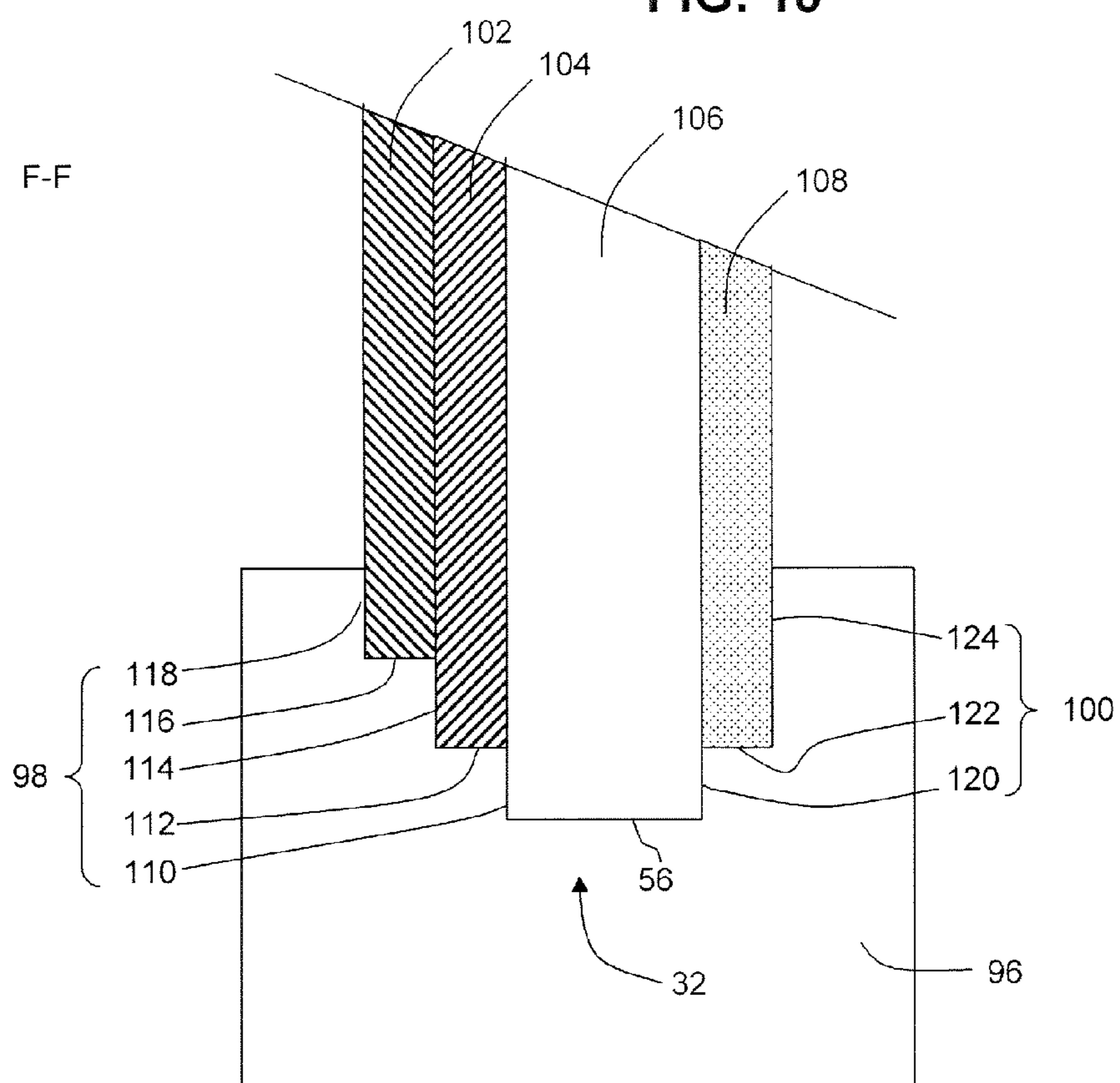


FIG. 19

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## POST AND PANEL CONSTRUCTION

## CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Application No. 61/401,620 filed Aug. 17, 2010 hereby incorporated by reference in its entirety.

## TECHNICAL FIELD

This invention relates generally to post or beam construction with panels.

## DESCRIPTION OF THE RELATED ART

Posts and beams have been used as support members for structures, for example, houses, buildings, and other shelters. Posts and beams are also popular in log-type buildings, for example log homes and log cabins, in which the posts and beams are cut logs or raw logs.

The term "post" as used herein generally refers to a substantially vertically oriented elongate structural member, such as a support column. The term "beam" as used herein generally refers to a substantially horizontal or substantially horizontally angled elongate structural member.

In many approaches to post and beam construction, the posts and beams are positioned apart from each other to form a frame and walls are constructed using the support of the frame. In some log constructions, two log posts are positioned apart from each other and horizontal logs are stacked against and between the two log posts to form a wall.

## SUMMARY OF INVENTION

An elongate structural member, such as a beam or post, is configured to interface with at least two panels. The elongate structure has a notch that receives the panels. The notch includes a base surface and two side surfaces, with at least one of the side surfaces being tiered. In this way, the base surface of the notch is able to accommodate one panel and the tiered side surface is able to accommodate another panel.

More particularly, in one aspect of the invention, an elongate structural member defining therein at least one notch is provided. The notch comprises a base surface and two side surfaces at opposite ends of the base surface. At least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other. The inner portion is substantially perpendicular and immediately adjacent to the base surface. The outer portion is offset from the inner portion and positioned further away from the other side surface than the inner portion. The notch is configured to receive at least a first panel and a second panel substantially parallel to each other. At least the base surface and the inner portion of the tiered surface are configured to contact the first panel. At least the outer portion of the tiered side surface is configured to contact the second panel.

The notch may be defined along the length of the elongate structural member. The notch may alternatively be defined along the width of the elongate structural member. The other side surface may not be tiered. The tiered side surface may include multiple outer portions and each outer portion may be positioned increasingly further away from the base surface and increasingly further away from the other side surface. Each outer portion in the tiered side surface may be configured to accommodate an additional panel. The elongate structural member may be either a post and or a beam. The elongate

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structural member has a round cross-section. At least two notches may be defined along the length of the elongate structural member and oriented substantially perpendicular to each other, and a portion of the perimeter of the elongate structural member defined between the two notches may be rounded.

In another aspect, there is also provided an assembly integrating an elongate structural member and a panel, wherein the elongate structural member has at least one notch defined within the elongate structural member. The notch comprises a base surface and two side surfaces at opposite ends of the base surface. At least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other. The inner portion is substantially perpendicular and immediately adjacent to the base surface. The outer portion is offset from the inner portion and positioned further away from the other side surface than the inner portion. A first panel is positioned within the notch and in contact with at least the base surface and the inner portion of the tiered surface.

The assembly may further comprise a second panel positioned within the notch and substantially parallel to the first panel, the second panel being in contact with at least the outer portion of the tiered surface. The second panel may be a siding panel. The second panel may be a finishing panel. The notch may be defined along the length of the elongate structural member. The notch may be defined along the width of the elongate structural member. The other side surface of the notch may not be tiered. The tiered side surface may comprise multiple outer portions. Each outer portion that is positioned increasingly further away from the base surface may also be positioned increasingly further away from the other side surface. Each outer portion in the tiered side surface may be configured to accommodate an additional panel. The elongate structural member may be a post or a beam. The elongate structural member may have a round cross-section. At least two of the notches may be defined along the length of the elongate structural member and oriented substantially perpendicular to each other, and a portion of the perimeter of the elongate structural member defined between the two notches may be rounded. The first panel may comprise two boards and a polymer material located between the two boards. The two boards may be oriented strand boards. The polymer material may comprise at least one of polyurethane and polyisocyanurate. The first panel may be affixed to the notch with at least one of adhesive, spray foam, and rubber stripping.

In general, the assembled components described herein may also be made and sold as a kit of parts. The kit comprises an elongate structural member having at least one notch defined within the elongate structural member. The notch comprises a base surface and two side surfaces at opposite ends of the base surface, wherein at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other. The inner portion is substantially perpendicular and immediately adjacent to the base surface. The outer portion is offset from the inner portion and positioned further away from the other side surface than the inner portion. The kit further comprises a first panel that is configured to be positioned within the notch and in contact with at least the base surface and the inner portion of the tiered surface.

The kit of parts may also comprise a second panel configured to be positioned within the notch and substantially parallel to the first panel. The second panel is in contact with at least the outer portion of the tiered surface. The second panel may be a siding panel. In another aspect, the second panel may also be a finishing panel. The notch may be defined along

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the length of the elongate structural member. The notch may be defined along the width of the elongate structural member. The other side surface of the notch may not be tiered. The tiered side surface may comprise multiple outer portions. Each outer portion that is positioned increasingly further away from the base surface may also be positioned increasingly further away from the other side surface. Each outer portion in the tiered side surface is configured to accommodate an additional panel. The elongate structural member may have a round cross-section. At least two of the notches may be defined along the length of the elongate structural member and oriented substantially perpendicular to each other, and a portion of the perimeter of the elongate structural member defined between the two notches may be rounded. The first panel may comprise two boards and a polymer material located between the two boards. The two boards may be oriented strand boards. The polymer material may comprise at least one of polyurethane and polyisocyanurate. The first panel may be affixed to the notch with at least one of adhesive, spray foam, and rubber stripping.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention or inventions are described, by way of example only, with reference to the appended drawings wherein:

FIG. 1 is a perspective view of buildings constructed using elongated members integrated with panels;

FIG. 2 is a perspective view of a corner post and panel assembly;

FIG. 3 is an exploded perspective view of the post and panel assembly of FIG. 2;

FIG. 4 is an enlarged partial view from the interior of the exploded perspective view of FIG. 3 showing notches in posts and beams;

FIG. 5 is another exploded perspective view from the exterior of the post and panel assembly of FIG. 2;

FIG. 6 is a cross-sectional view of the corner assembly of FIG. 2 taken along line A-A;

FIG. 7 is a side view of an elongated structural member depicting a tiered notch along its length, a tiered notch along its width, and a notch for receiving a post;

FIG. 8 is another side view of the elongated structural member shown in FIG. 7, with the view facing into the tiered notch along its length and facing into the notch for receiving the post;

FIG. 9 is another side view of the elongated structural member shown in FIG. 7, depicting a post inserted into the notch for receiving the post;

FIG. 10 is a perspective view of an elongated structural member integrated with a panel;

FIG. 11 is a cross-sectional view of the assembly of FIG. 10 taken along line B-B;

FIG. 12 is a perspective view of an elongated structural member integrated with three panels;

FIG. 13 is a cross-sectional view of the assembly of FIG. 12 taken along line C-C;

FIG. 14 is an elevation view of an elongated structural member integrated with two panels and including a flashing;

FIG. 15 is a cross-sectional view of the assembly of FIG. 14 taken along line D-D;

FIG. 16 is a perspective view of an elongated structural member with a notch having one tiered side surface and one non-tiered side surface, and depicting two panels inserted into the notch;

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FIG. 17 is a cross-sectional view of the elongated structural member and the two panels shown in FIG. 16 taken along line E-E;

FIG. 18 is a perspective view of an elongated structural member with a notch depicting two tiered side surfaces, with one tiered side surface having more tiers than the other tiered side surface, and depicting four panels inserted into the notch; and

FIG. 19 is a cross-sectional view of the elongated structural member shown in FIG. 18 taken along line F-F.

#### DETAILED DESCRIPTION

It will be appreciated that for simplicity and clarity of illustration, in some cases, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. In addition, some details or features are set forth to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein are illustrative examples that may be practiced without these details or features. In other instances, well-known methods, procedures and components have not been described in detail so as not to obscure the invention illustrated in the examples described herein. Also, the description is not to be considered as limiting the scope of the example embodiments described herein or illustrated in the drawings.

In an example embodiment, the proposed elongate structural member defines therein at least one notch. The notch includes a base surface and two side surfaces at opposite ends of the base surface. At least one of the side surfaces is tiered. The tiered side surface includes an inner portion and an outer portion that are substantially parallel to each other. The inner portion is substantially perpendicular and immediately adjacent to the base surface. The outer portion is offset from the inner portion and positioned further away from the other side surface than to the inner portion. In other words, the distance between the outer portion and the other side surface is greater than the distance between the inner portion and the other side surface. The notch is also configured to receive at least a first panel and a second panel that can be positioned substantially parallel to each other within the notch. At least the base surface and the inner portion of the tiered surface are able to contact the first panel, and at least the outer portion of the tiered surface able to contact the second panel.

It is appreciated that an elongate structural element can refer to a post, a beam, or a strut, and may be made of various materials. Non-limiting examples of materials include a log, concrete, metal, and composites.

Many post and beam constructions use logs to form walls between two posts. Logs are typically substantially cylindrically-shaped. The logs are substantially horizontally oriented and stacked vertically on top of each other to form a wall. A wall formed of many logs results in a rippled or bumpy wall surface. In many cases, the sides of the logs are flattened. The elongate flattened sides of each log may be oriented to face the same direction in order to form a flat-faced wall. The flat-faced wall is desirable if additional paneling (e.g. siding) is to be placed against the wall, since the flat-face allows for more contact between the paneling and the wall. Flattening the logs is a time-consuming and expensive process.

The logs that form the walls may also not be uniform. The logs may shrink or expand over time due to different weather conditions and change in moisture content. This variability in sizing and shape can cause cracks to form between the logs

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and the posts, which may lead to air, water, and other weather leaks in the wall. This often leads to more frequent repairs to the log walls.

Logs are cut to exact dimensions in order to reduce the possibility of having cracks or leaks formed between the logs. This process is costly and time-consuming.

Another approach is to cover or seal cracks between the logs by placing trim or moulding between the logs. The trim is typically scribed or cut by a skilled tradesperson to match the log contours. The process of fabricating and installing the trim is costly and time-consuming.

Panels have been used to form walls instead of stacking horizontal logs. However, in such circumstances, many post and panel constructions result in posts and beams with rectangular-shaped cross-sections. This is sometimes undesirable, since building owners prefer the aesthetics of rounded posts and beams.

The proposed post and panel construction as described herein addresses such difficulties by providing an elongate structural member that can easily interface with two or more panels. In particular, the elongate structural member includes a tiered notch that allows one panel to be slotted into the notch, and another panel, which may be an exterior siding panel or an interior finishing panel, to be slotted into the notch as well.

In FIG. 1, two representative buildings 2 and 4 are shown constructed with posts and panels. The beams 6 extend horizontally and the posts 8 extend upwardly. The panels are used to form the walls 10 and roof 11 number of the buildings 2, 4. As discussed below, the elongate structural members, namely beams 6 and posts 8, have notches that are used to integrate the panels 10 with the elongate structural members. The panels (e.g. the walls 10 and the roof 11) shown are typically, although not necessarily, exterior siding panels which can have different textured finishes. Non-limiting examples include cedar, Hardie™ board, vinyl siding, stucco, stone, and cultured stone. A panel, for example, may also be made of multiple panel pieces that are assembled together.

In FIGS. 2, 3, 4 and 5, different views of an example corner assembly 12 are shown. Such a corner assembly 12 can be used to form a building, such the buildings 2, 4 shown in FIG. 1. Two panels 14 and 14' are shown integrated with a post 20 and three beams 26, 28, 30. The assembled configuration is shown in FIG. 2. Also shown is another set of panels 22 and 22', covering panels 14 and 14', respectively. If the corner assembly 12, as shown in FIG. 2, were part of a building's interior, for example, the other set of panels 22, 22' would be interior finishes. If the corner assembly 12, as shown in FIG. 2, were part of an exterior of a building, for example, the other set of panels 22, 22' would be exterior siding. The curved surface 24 of the post 20 can also be seen.

The panel 14 can be, for example, a composite panel. For example, as shown in FIG. 2, the panel 14 is a structurally insulated panel (SIP). The panel 14 includes two boards 16 with a polymer material 18 situated between the fibre boards 16. The boards 16 can be oriented strand or fibre boards, also commonly referred to as oriented strand boards (OSB). The boards 16 may also be of different materials, such as for example, magnesium oxide, plywood, hemp board, drywall, tin, or metal, or combinations thereof. The polymer material 18, for example, is polyurethane (PUR) or polyisocyanurate (PIR), or a mixture of both. Such a polymer blend has a high thermal resistance R value, for example R28. In other words, a material can be selected that will provide high insulation. The boards 16 provide further structural integrity to the panel 14. Such a composite panel will increase the insulation in the

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wall and thereby save costs for heating or cooling a building constructed by the post/beam and panel system, as described herein.

The SIP can be manufactured by spraying the polymer material between the two boards 16. The polymer material then cures and hardens, forming the SIP (e.g. composite panel) 14. The use of glue is not required to form the SIP since the polymer material bonds the boards 16 together. The finished SIP is a unitary structure. In an example embodiment when used to form walls, the composite panel 14 may be approximately 4.5 inches thick. When used to form a roof, for example, the composite panel 14 may be approximately 6.5 inches thick.

It will be appreciated that the panel 14 can have different constructions and need not be of a composite construction. For example, the panel 14 can be of a uniform composition.

The panel 22 is for siding or finishing and covers the panel 14, and its selection may depend on whether the panel 22 is used for interior or exterior applications. In both applications, the panel 22 can be used for aesthetic or structural purposes, or both.

For exterior applications, the panel 22 may be a siding panel used for weather-proofing purposes to protect against weather, for example moisture and wind. A siding panel can have different have finishes. Similar characteristics can apply to siding panel 22'.

For interior applications, the panel 22 may be a finish that is exposed to the interior of the building. Non-limiting examples of such a finish may be dry-wall material, tiling, and mirrors. Similar characteristics can apply to siding panel 22'.

In the exploded view of FIG. 3, it is more clearly seen that the beams 26, 28 and 30 are integrated in an overlapping manner. In particular, the post 20 has notches 32 and 32' that extend vertically along its length. The notches 32 and 32' each have at least one tiered side wall 64 that can accommodate at least two panels. The tiered side wall 64 is described in further detail below, for example, in FIG. 6.

Continuing with FIG. 3, the vertical edge 34 of the panel 14 and the siding panel 22 are inserted into the notch 32 of the post 20. The vertical edge 36 of the panel 14' and the siding panel 22' are inserted into the notch 32' of the post 20.

The upper horizontal edge 46 of the panel 14 and the siding 22 are inserted into the notch 32 of the beam 26. The notch 32 of the beam 26 extends horizontally along its length.

The beam 26 also includes another notch 38 that also has at least one tiered side wall 74. The tiered side wall 74 is described in further detail below, for example in FIG. 7. The notch 38 extends along the width of the beam, in this example in a vertical orientation. As can be seen more clearly in FIG. 4, the upper portion of the vertical edge 36 of the panel 14' and the siding 22' can be inserted into the notch 38.

The upper horizontal edge 48 of the panel 14' and the siding 22' can be inserted into the notch 32 extending along the length of the beam 28.

The beams 28 and 30 have notches 40, 42 and 44 to accommodate overlapping of the beams. For example, if the beams 26, 28 and 30 are rounded, the notches 40, 42 and 44 are also rounded to accommodate the rounded profile of the beams. In particular, notch 40 extends across the width of beam 28 and interfaces with beam 26. Notch 44 extends across the width of beam 30 and interfaces with beam 28. Notch 42 extends along the length of beam 30 and interfaces with beam 26.

As can be better seen in FIGS. 4 and 5, the upper portion 50 of the post 20 is tapered. For example, the post can be tapered to have a rectangular or square cross-section. As seen in FIG. 5, the rounded surface 54 of the post 20 is tapered to a rectangular or a square cross-section at the upper portion 50.

The upper portion **50** of the post **20** is inserted into another notch **52** of the beam **26**. The notch **52** is of complementary shape to the upper portion **50** of the post **20**. Other features of the notches **32**, **38** and **52** are discussed below.

Turning to FIG. 6, a cross-sectional view of the corner assembly **12** along the line A-A of FIG. 2 is shown. The cross-sectional view shows the elongate structural member **20** integrated with two panels **14**, **14'**. It will be appreciated that this configuration can have different orientations. For example, if the elongate structural member **20** is oriented vertically, the structural member **20** is a post with two panels **14**, **14'** forming walls, for example in a corner of a room as shown in FIG. 2. In another example, if the structural member **20** is oriented horizontally, then the structural member **20** is a beam integrated with a vertically oriented panel **14** and a horizontally oriented panel **14'**.

The two notches **32** and **32'** are oriented in an angled position relative to each other along the structural member **20**. For example, the angled position of the notches **32** and **32'** may be perpendicular to each other, so that the panels **14** and **14'** are also in a perpendicular position to each other when inserted into the notches **32** and **32'**.

The notches **32** and **32'** each include a base surface **56** and **56'**, respectively, and two side surfaces, with at least one of the side surfaces being a tiered side surface. Notch **32** has two side surfaces **64** that are both tiered. Notch **32'** also has two side surfaces **64'** that are both tiered. Although many of the figures shown herein include notches **32** with two side surfaces that are tiered, in other configurations one of the side surfaces may be tiered and the other side surface may not be tiered.

The elongate structural member **20** may, for example, have a cross-sectional width of approximately 12 inches to 14 inches. If the elongate structural member **20** is circular, like a log, then the diameter may be approximately 12 inches to 14 inches.

The tiered side surface **64** includes an inner portion **62** and an outer portion **58**. The inner portion **62** of the tiered surface **64** is immediately adjacent to, and substantially perpendicular with the base surface **56**. The outer portion **58** of the tiered side surface **64** is positioned further out from the base surface **56** and is offset from the inner surface **62**. In the example embodiment shown, the outer portion **58** and the inner portion **62** are substantially parallel to each other.

The base surface **56** and the inner portion **62** of the tiered surface **64** are in contact with the panel **14**. The panel **14** is positioned within the most inner tier of the notch **32**. The offset outer portion **58** and ledge **60** form another tier in the notch **32**. Another panel **22** (e.g. siding or finishing) can be inserted into this tier of the notch **32**. Panel **22** is in contact with the outer portion **58** and ledge **60**.

In this example configuration, two of the notches **32**, **32'** are defined along the length of the elongate structural member **20** and are oriented substantially perpendicular to each other. Furthermore, a portion of the perimeter surface **24** of the elongate structural member defined between the two notches is rounded.

This configuration allows for the rounded surfaces **24** and **54** of the elongate structural member **20** to be exposed. For example, the rounded surface **24** may be the inside corner of a room with wall panels **14'** and **14**. It may be desirable to see the rounded surface **24** while located inside the room.

Turning to FIGS. 7, 8 and 9, the beam **26** is shown with notches **32**, **38** and **52** from different views. FIGS. 7 and 8 show the beam **26** in isolation and FIG. 9 shows the beam **26** integrated with the post **20**. As discussed above, notches **38**

and **32** are for receiving panels. Notches **38** and **32** have at least one tiered side surface to accommodate two or more panels.

Notch **32** includes a base surface **56** and two side surfaces, with at least one being a tiered side surface. The tiered side surface includes an inner portion **62**, a ledge **60** and an outer portion **58**. Notch **32** extends along the length of the beam **26**.

Notch **38** extends along the width of the beam **26** and also includes a base surface **76** and two side surfaces. At least one of the side surfaces is a tiered side surface **74**, which includes an inner portion **72**, a ledge **70** and an outer portion **68**. Similar to notch **32**, the tiered side surface **74** allows a first panel to be received and in contact with the base surface **76** and the inner portion **72**. A second panel can also be received in the notch **38** with the second panel being in contact with the ledge **70** and outer portion **68**.

Notch **52** is configured to receive the upper portion **50** of the post **20**, as shown in FIG. 9. The space defined by the notch **52** extends to the space defined by the notch **38** and the space defined by the notch **32**.

In FIG. 9, when the post **20** is inserted into the notch **52**, the space defined by the vertical notch **32'** of the post **20** extends upwardly to the space defined by the notch **38** of the beam **26**. The profiles of the notch **32'** and the notch **38** are, for example, identical, so that a panel **14'** and siding **22'** can be inserted into both notches **32'** and **38**. This is shown in the exploded view in FIG. 3.

In FIG. 10, a perspective view of an elongate structural member **80** is shown integrated with a panel **14**. The structural member **80** may have rounded surfaces **78**, such as the surfaces of a log post or log beam. In this embodiment, there are two notches **32** in the structural member **80**. The notch **32** may extend along the length of the elongate structural member **80**, as shown. In another example, the notch **32** may extend along the width of the elongate structural member **80**, similar to the notch **38** in FIG. 3 that extends along the width of the beam **26**.

FIG. 11 shows the cross-sectional view of an elongate structural member **80** and panel **14** along the line B-B in FIG. 10. Each notch **32** includes a base surface **56** and two side surfaces, with at least one of the side surfaces being a tiered side surface **64**. Although many of the figures shown herein include notches **32** with two tiered side surfaces **64**, in other configurations one of the side surfaces is tiered and the other side surface is not tiered.

A tiered side surface **64** includes an inner portion **62** and an outer portion **58**, which are offset from each other, for example, by a ledge **60**. The distance between the outer portion **58** of the tiered side surface **64** and the other side surface, shown as "D1" in FIG. 11, is greater than the distance between the inner portion **62** and the other side surface, illustrated as "D2" in FIG. 11.

The base surface **56** and the inner portion **62** of the tiered surface **64** are in contact with the panel **14**, so that the panel **14** is positioned within the most inner tier of the notch **32**. The offset outer portion **58** and the ledge **60** form another tier in the notch **32**. Another panel or siding can be inserted into this tier of the notch **32**.

For example, in FIG. 12, the panel **14** is shown in the inner tier of the notch **32**. A second panel **82**, for example a siding or finishing panel, is shown positioned next to one side of the first panel **14**. A third panel **84**, siding or finishing panel, is shown positioned next to the other side of the first panel **14**. All three of the panels **14**, **82** and **84** are integrated into the notch **32**.

As seen more clearly in FIG. 13, showing the cross-section along the line C-C in FIG. 12, the second panel **82** is slotted

into the other tier of the notch 32, and is in contact with the first panel 14 and the outer portion 58 of the tiered side surface 64. The first panel 14 is nestled deeper within the elongate structural member 80 than to the second panel 82 due to the configuration of the tiered side surface 64 of the notch 32.

As the notches 32 each include two tiered side surfaces 64, two panels, in addition to the first panel 14, can be placed in notch 32. The third panel 84 is placed adjacent to, and generally parallel with, the first panel 14. A portion of the third panel 84 is nestled between the first panel 14 on one side of the panel 84, and the notch's ledge 60 and the outer portion 58 of the side surface 64 on the other side of the panel 84.

Although an outer panel is shown on each side of the first panel 14, in certain embodiments, an outer panel may be positioned only on one side of the first panel 14. In yet other embodiments, there may be multiple outer panels positioned against a side of the first panel 14. There may also be multiple tiers in the side surface 64 of the notch 32 to accommodate the multiple outer panels.

The basic configurations shown in FIGS. 10, 11, 12 and 13, and variations thereof, can be used in different orientations to form walls, roofs, floors, and other structures.

In FIG. 14, an example of an elongate structural member 80 is shown in a horizontal orientation and functions as a beam. The beam 80 is positioned between a panel 14 located above, and another panel 14 located below.

This is shown more clearly in the cross-sectional view in FIG. 15, taken along line D-D in FIG. 14. A siding panel 86 is shown covering the panel 14 above. The panels 14 are nestled or fitted into the two notches 32 that extend along the length of the beam 80. In such a configuration, the panels 14 located above and below the beam 80 are also called gable walls.

The notches 32 also include tiered side surfaces to hold multiple panels. One side surface 64 is tiered, including the inner portion 62, ledge 60 and outer portion 58, while the other side surface 90 is not tiered. The non-tiered side surface 90 can be, for example, flat. The exterior panel 86 is positioned against the panel 14 and is on the same side of the notch 32 as the non-tiered surface 90. The exterior panel 86 is not nestled within the notch 32.

Flashing 88 is also placed at the bottom of the exterior panel 86 and along the upper portion of the beam 80. "Flashing" typically comprises thin continuous pieces of impervious material such as sheet metal, installed to prevent the passage of water into a structure from an angle or joint. The flashing 88 is angled downwardly and is used to direct or shed precipitation and debris over the upper portion of the beam 80. This helps to reduce or prevent precipitation and debris from entering into spaces, if any, in the notch 32, whereby the spaces are defined between the non-tiered side surface 90 and the side of the panel 14.

In FIG. 16, another example embodiment of an elongate member 80 is shown having a notch 32. The notch 32 has inserted therein a first panel 94 and a second panel 92. Turning to FIG. 17, a cross-sectional view is shown taken along line E-E in FIG. 16. The notch 32 has a base surface 56 and two side surfaces 64, 90. One side surface 90 is not tiered. The other side surface 64 is tiered and can accommodate a panel 92, for example a siding or finishing panel, in addition to the panel 94. It can be appreciated that the notch 32 can therefore have various configurations. It will also be appreciated that the panels 92 and 94 may or may not be SIPs.

FIG. 18 shows another example embodiment of an elongate member 96 that has a rectangular shaped cross-section. The elongate member 96 has defined therein a notch 32 having two side surfaces 98 and 100. Both side surfaces 98, 100

are tiered surfaces. The notch 32 has inserted therein four panels 102, 104, 106 and 108.

It will be appreciated that the elongate member 96 may have different cross-sectional profiles, such as, for example, circular, rectangular, elliptical, pentagonal or triangular profiles.

In FIG. 19, a cross-sectional view is shown taken along line F-F in FIG. 18. The notch 32 is along the length of the elongate member 96 and includes a base surface 56 and two side surfaces 98 and 100. Side surface 100 includes an inner portion 120, a ledge 122 and an outer portion 124. Side surface 100 has one tier to accommodate panel 108 in addition to the first panel 106. The first panel 106 is in contact with the base surface 56. Panel 106 can be, for example, a SIP.

Side surface 98 has more tiers than the other side surface 100. In particular, side surface 98 includes a first surface 110 that is immediately adjacent to the base surface 56. A first ledge 112 connects the second surface 114 to the first surface 110. A second ledge 116 connects the third surface 118 to the second surface 114. The first surface 110 is positioned deepest or most inwardly within the elongate structural member 96, followed by the second surface 114 and least inwardly the third surface 118. The surfaces 110, 114 and 118 are substantially parallel to one another and are each substantially perpendicular to the base surface 56. In another example embodiment, the ledges 112 and 116 are substantially parallel to each other and are each substantially parallel to the base surface 56.

The tiered side surface 98 includes multiple outer portions, surfaces 114, 118. Each outer portion that is positioned increasingly further away from the base surface 56 is also positioned increasingly further away from the other side surface 100. This also applies when the other side surface 100 is, for example, flat or tiered. Each of the multiple outer portions in the tiered side surface is configured to accommodate an additional panel.

As seen in FIG. 19, the tiered surface 98 accommodates two additional panels, for example siding or finishing panels 102, 104. Panel 106 is nestled between surfaces 110, 120 and 56. Panel 104 is nestled between the panel 106, the second surface 114 and the first ledge 112. Panel 102 is nestled between the panel 104, the third surface 118 and the second ledge 116.

In another example configuration, the surfaces 118, 114 and 110 are angled relative to each other, and may not be substantially perpendicular to the base surface 56. In another example configuration, the surfaces 118, 114 and 110 are curved surfaces. Similarly, in another example configuration, surfaces or ledges 116, 112, 56 and 122 are curved surfaces.

It can therefore be seen that the notches in the elongate structural members can have various configurations to accommodate multiple panels.

The configuration of the elongate construction member, the post or the beam, and the panels significantly reduces the amount of effort and costs to construct a building. The panels 14 and additional panels, for example siding or finishing panels, can be easily inserted into the tiered notches. For example, the first panel 14 can be moved against the base surface 56, followed by moving an additional panel, for example siding or finishing panels against a ledge 60.

In an example embodiment, the panels 14 or additional panels, for example siding or finishing panels, or both, are affixed to the notches in the elongate member. They can be affixed, for example, by adhesives, spray foam, rubber strips, or combinations thereof. The spray foam may be a mixture of glue and polyurethane.

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The panels **14** and additional panels, for example siding or finishing panels, can be large in size, therefore reducing the number of smaller parts. Larger panels help reduce the number of assembly operations, thereby reducing construction time. By contrast, a log wall has many components and requires more assembly operations.

The panels **14** and additional panels, for example siding or finishing panels, can also be cut and fabricated easily to exact dimensions. For example, the panels **14** and additional panels, for example siding or finishing panels, can be pre-fabricated to standardized dimensions, or cut using a computer numerical control machine, or both. The precise dimensioning of the panels **4** and additional panels, for example siding or finishing panels, can be achieved at lower costs than, for example, log walls. Further, the precise dimensioning of the panels **14** and additional panels, for example siding or finishing panels, facilitates a better fit and form when integrating the panels or additional panels with the elongate structural members **80** (e.g. posts and beams).

Cost savings are also achieved by the materials. Panel walls typically cost less than log walls. Moreover, the use of panels reduces the use of trim material, which can be costly.

In general, an elongate structural member defining therein at least one notch is provided. The notch comprises a base surface and two side surfaces at opposite ends of the base surfaces wherein at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion; and the notch is configured to receive at least a first panel and a second panel substantially parallel to each other, with at least the base surface and the inner portion of the tiered surface configured to contact the first panel, and at least the outer portion of the tiered side surface configured to contact the second panel.

In another aspect, the notch is defined along the length of the elongate structural member. In another aspect, the notch is defined along the width of the elongate structural member. In another aspect, the other side surface is not tiered. In another aspect, the tiered side surface includes multiple outer portions and each outer portion is positioned increasingly further away from the base surface and increasingly further away from the other side surface. In another aspect, each outer portion in the tiered side surface is configured to accommodate an additional panel. In another aspect, the elongate structural member is any one of a post and a beam. In another aspect, the elongate structural member has a round cross-section. In another aspect, at least two notches are defined along the length of the elongate structural member and oriented substantially perpendicular to each other, a portion of the perimeter of the elongate structural member defined between the two notches is rounded.

There is also provided an assembly integrating an elongate structural member and a panel, wherein the elongate structural member has at least one notch defined within the elongate structural member, the notch comprising a base surface and two side surfaces at opposite ends of the base surface; at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner por-

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tion; and a first panel is positioned within the notch and in contact with at least the base surface and the inner portion of the tiered surface.

In another aspect, the assembly further comprises a second panel positioned within the notch and substantially parallel to the first panel, the second panel in contact with at least the outer portion of the tiered surface. In another aspect, the second panel is a siding panel. In another aspect, the second panel is a finishing panel. In another aspect, the notch is defined along the length of the elongate structural member. In another aspect, the notch is defined along the width of the elongate structural member. In another aspect, the other side surface of the notch is not tiered. In another aspect, the tiered side surface comprises multiple outer portions, and in each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface. In another aspect, each outer portion in the tiered side surface is configured to accommodate an additional panel. In another aspect, the elongate structural member is any one of a post and a beam. In another aspect, the elongate structural member has a round cross-section. In another aspect, at least two of the notches are defined along the length of the elongate structural member and oriented substantially perpendicular to each other, and a portion of the perimeter of the elongate structural member defined between the two notches is rounded. In another aspect, the first panel comprises two boards and a polymer material located between the two boards. In another aspect, the two boards are oriented strand boards. In another aspect, the polymer material comprises at least one of polyurethane and polyisocyanurate. In another aspect, the first panel is affixed to the notch with at least one of adhesive, spray foam, and rubber stripping.

The components described herein can be sold as a kit of parts. The kit comprises an elongate structural member having at least one notch defined within the elongate structural member. The notch comprises a base surface and two side surfaces at opposite ends of the base surface, wherein at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other. The inner portion is substantially perpendicular and immediately adjacent to the base surface. The outer portion is offset from the inner portion and positioned further away from the other side surface than the inner portion. The kit further comprises a first panel that is configured to be positioned within the notch and in contact with at least the base surface and the inner portion of the tiered surface.

While the basic principles of these inventions have been described and illustrated herein it will be appreciated by those skilled in the art that variations in the disclosed arrangements, both as to their features and details and the organization of such features and details, may be made without departing from the spirit and scope thereof. Accordingly, the embodiments described and illustrated should be considered only as illustrative of the principles of the inventions, and not construed in a limiting sense.

The invention claimed is:

1. An elongate structural member defining therein at least one notch, the notch comprising a base surface and two side surfaces at opposite ends of the base surfaces, wherein:
  - at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

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the notch is configured to receive at least a first panel and a second panel substantially parallel to each other, with at least the base surface and the inner portion of the tiered surface configured to contact the first panel, and at least the outer portion of the tiered side surface configured to contact the second panel;

the notch is defined along at least a portion of the length of the elongate structural member;

the other side surface is not tiered;

the tiered side surface includes multiple outer portions and each outer portion is positioned increasingly further away from the base surface and increasingly further away from the other side surface;

the elongate structural member is any one of a post and a beam;

the elongate structural member has a round cross-section; and

at least two notches are defined along the length of the elongate structural member and oriented substantially perpendicular to each other and a portion of the perimeter of the elongate structural member defined between the two notches is rounded.

2. An elongate structural member defining therein at least one notch, the notch comprising a base surface and two side surfaces at opposite ends of the base surfaces, wherein:

at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

the notch is configured to receive at least a first panel and a second panel substantially parallel to each other, with at least the base surface and the inner portion of the tiered surface configured to face the first panel, and at least the outer portion of the tiered side surface configured to face the second panel;

the notch is defined along the width of the elongate structural member;

the other side surface is not tiered;

the tiered side surface includes multiple outer portions and each outer portion is positioned increasingly further away from the base surface and increasingly further away from the other side surface;

the elongate structural member is any one of a post and a beam; and

the elongate structural member has a round cross-section.

3. An assembly comprising a post, a beam, a first panel and a second panel, the beam supported by the post and positioned above and at an angle to the post, wherein:

the post comprises at least one notch;

the beam comprises at least one notch;

the notch in the post and the notch in the beam each comprising a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces in each of the notch in the post and the notch in the beam is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a side of the first panel is positioned within the notch in the post and is facing at least the base surface and the inner portion of the tiered surface of the notch in the post;

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a top side of the first panel is positioned within the notch in the beam and is facing at least the base surface and the inner portion of the tiered surface of the notch in the beam;

a side of the second panel is positioned within the notch in the post, the second panel substantially parallel to the first panel, and the side of the second panel is facing at least the outer portion of the tiered surface of the notch in the post; and

a top side of the second panel is positioned within the notch in the beam and is facing at least the outer portion of the tiered surface of the notch in the beam.

4. The assembly of claim 3, further comprising a second post also supporting the beam and positioned in spaced relation to the post, wherein:

the second post comprises at least one notch;

the notch in the second post comprises a base surface and two side surfaces at opposite ends of the base surface, at least one of the side surfaces in the notch in the second post being tiered and comprising an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a second side of the first panel, which is opposite to the side of the first panel and adjacent to the top side of the first panel, is positioned within the notch in the second post and is facing at least the base surface and the inner portion of the tiered surface of the notch in the second post; and

a second side of the second panel, which is opposite to the side of the second panel and adjacent to the top side of the second panel is positioned within the notch in the second post, and the second side of the second panel is facing in at least the outer portion of the tiered surface of the notch in the second post.

5. The assembly of claim 3, wherein the second panel is a siding panel.

6. The assembly of claim 3, wherein the second panel is a finishing panel.

7. The assembly of claim 3, wherein the notch in the post is defined along at least a portion of the length of the post.

8. The assembly of claim 3, wherein the notch in the beam is defined along at least a portion of the length of the beam.

9. The assembly of claim 3, wherein the other side surface in at least one of the notch in the beam and the notch in the post is not tiered.

10. The assembly of claim 3, wherein the other side surface is tiered in at least one of the notch in the beam and the notch in the post.

11. The assembly of claim 3, wherein the tiered side surface, in at least one of the notch in the beam and the notch in the post, comprises multiple outer portions, and in each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface.

12. The assembly of claim 11, wherein each outer portion in the tiered side surface, in at least one of the notch in the beam and the notch in the post, is configured to accommodate an additional panel.

13. The assembly of claim 3, wherein the post, the beam, the first panel and the second panel form a wall of a building.

14. The assembly of claim 3 wherein at least one of the post and the beam has a round cross-section.

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15. The assembly of claim 3 for use at a corner of a structure, wherein the assembly further comprising:

- the post further comprising a second notch within the post, both the notch and the second notch in the post are defined along at least a portion of the length of the post and oriented substantially perpendicularly to each other;
- a second beam positioned above and supported by the beam, the second beam comprising at least one notch;
- the notch in the second beam and the second notch in the post each comprising a base surface and two side surfaces at opposite ends of the base surface, at least one of the side surfaces in each of the notch in the second beam and the second notch in the post being tiered and comprising an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;
- a side of a third panel is positioned within the second notch in the post and is facing at least the base surface and the inner portion of the tiered surface of the second notch in the post;
- a top side of the third panel is positioned within the notch in the second beam and is facing at least the base surface and the inner portion of the tiered surface of the notch in the second beam;
- a side of a fourth panel is positioned within the second notch in the post, the fourth panel being substantially parallel to the third panel, and the side of the fourth panel is facing at least the outer portion of the tiered surface of the second notch in the post; and
- a top side of the fourth panel is positioned within the notch in the second beam and is facing at least the outer portion of the tiered surface of the notch in the second beam.

16. The assembly of claim 3, wherein the first panel comprises two boards and a polymer material located between the two boards.

17. The assembly of claim 16, wherein the two boards include at least one of oriented strand boards, magnesium oxide boards, hemp boards, vinyl boards and drywall.

18. The assembly of claim 16, wherein the polymer material comprises at least one of polyurethane and polyisocyanurate.

19. The assembly of claim 3, wherein the first panel is affixed to at least one of the notch in the post and the notch in the beam with at least one of adhesive, spray foam and rubber stripping.

20. An assembly integrating an elongate structural member and a panel, wherein:

- the elongate structural member has at least one notch defined within the elongate structural member, the notch comprising a base surface and two side surfaces at opposite ends of the base surface;
- at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;
- a first panel is positioned within the notch and is facing at least the base surface and the inner portion of the tiered surface;
- a second panel is positioned within the notch and substantially parallel to the first panel, the second panel is facing at least the outer portion of the tiered surface;

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the notch is defined along at least a portion of the length of the elongate structural member;

the other side surface of the notch is not tiered;

the tiered side surface comprises multiple outer portions, and each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface;

the elongate structural member is any one of a post and a beam;

the elongate structural member has a round cross-section; the first panel comprises two boards and a polymer material located between the two boards; and

the first panel is affixed to the notch with at least one of adhesive, spray foam, and rubber stripping.

21. An assembly comprising a first post, a second post, a beam, a first panel and a second panel, the beam supported by the first post and the second post and positioned above and at an angle to the first post and the second post, wherein:

the first post comprises at least one notch;

the second post comprises at least one notch;

the beam comprises at least one notch;

the notch in the first post, the notch in the second post, and the notch in the beam each comprise a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces in each notch in the first post, the second post and the beam is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a first side of the first panel is positioned within the notch in the first post and is facing at least the base surface and the inner portion of the tiered surface of the notch in the first post;

a top side of the first panel is positioned within the notch in the beam and is facing at least the base surface and the inner portion of the tiered surface of the notch in the beam;

a second side of the first panel, which is opposite to the first side of the first panel and adjacent to the top side of the first panel, is positioned within the notch in the second post and is facing at least the base surface and the inner portion of the tiered surface of the notch in the second post;

a first side of the second panel is positioned within the notch in the first post, the second panel is substantially parallel to the first panel, and the first side of the second panel is facing at least the outer portion of the tiered surface of the notch in the first post;

a top side of the second panel is positioned within the notch in the beam and is facing at least the outer portion of the tiered surface of the notch in the beam; and

a second side of the second panel, which is opposite to the first side of the second panel and adjacent to the top side of the second panel, is positioned within the notch in the second post, and the second side of the second panel is facing at least the outer portion of the tiered surface of the notch in the second post.

22. An assembly integrating an elongate structural member and a panel, wherein:

the elongate structural member comprising at least one notch, the notch comprising a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially

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parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion; 5

a first panel is positioned within the notch and is facing at least the base surface and the inner portion of the tiered surface;

a second panel is positioned within the notch and substantially parallel to the first panel, the second panel is facing at least the outer portion of the tiered surface; 10

the notch is defined along the width of the elongate structural member;

the tiered side surface comprises multiple outer portions, and in each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface; 15

the elongate structural member is any one of a post and a beam;

the elongate structural member has a round cross-section; 20

and

the first panel comprises two boards and a polymer material located between the two boards.

**23.** A kit of parts for integrating a post, a beam, a first panel and a second panel the kit comprising: 25

a post and a beam, the beam configured to be supported by the post and positioned above, and at an angle to the post;

the post comprising at least one notch;

the beam comprising at least one notch;

the notch in the post and the notch in beam each comprising a base surface and two side surfaces at opposite ends of the base surface; 30

at least one of the side surfaces in each of the notch in the post and the notch in the beam is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion; 35

a first panel comprising a side and a top side, the side of the first panel configured to be positioned within the notch in the post and be facing at least the base surface and the inner portion of the tiered surface of the notch in the post, and the top side of the first panel configured to be positioned within the notch in the beam and be facing at least the base surface and the inner portion of the tiered surface of the notch in the beam; and 40

a second panel comprising a side and a top side, the side of the second panel configured to be positioned within the notch in the post, the second panel configured to be substantially parallel to the first panel, the side of the second panel configured to be facing at least the outer portion of the tiered surface of the notch in the post, and the top side of the second panel configured to be positioned within the notch in the beam and be facing at least the outer portion of the tiered surface of the notch in the beam. 45

**24.** The kit of parts of claim 23, further comprising a second post also configured to support the beam and be positioned in spaced relation to the post, wherein: 50

the second post comprises at least one notch defined within the second post;

the notch in the second post comprises a base surface and two side surfaces at opposite ends of the base surface; 60

at least one of the side surfaces in the notch in the second post being tiered and comprising an inner portion and an

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outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

the first panel comprises a second side, which is opposite to the side of the first panel and adjacent to the top side of the first panel, and the second side of the first panel is configured to be positioned within the notch in the second post and be facing at least the base surface and the inner portion of the tiered surface of the notch in the second post; and

the second panel comprises a second side, which is opposite to the side of the second panel and adjacent to the top side of the second panel, the second side of the second panel is configured to be positioned within the notch in the second post, and the second side of the second panel configured to be facing at least the outer portion of the tiered surface of the notch in the second post.

**25.** The kit of parts of claim 23, wherein the second panel is a siding panel.

**26.** The kit of parts of claim 23, wherein the second panel is a finishing panel.

**27.** The kit of parts of claim 23, wherein the notch in the post is defined along at least a portion of the length of the post.

**28.** The kit of parts of claim 23, wherein the notch in the beam is defined along at least a portion of the length of the beam.

**29.** The kit of parts of claim 23, wherein the other side surface in at least one of the notch in the beam and the notch in the post is not tiered.

**30.** The kit of parts of claim 23, wherein the other side surface in at least one of the notch in the beam and the notch in the post is tiered.

**31.** The kit of parts of claim 23, wherein the tiered side surface in at least one of the notch in the beam and the notch in the post comprises multiple outer portions, and in each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface.

**32.** The kit of parts of claim 31, wherein each outer portion in the tiered side surface in at least one of the notch in the beam and the notch in the post is configured to accommodate an additional panel.

**33.** The kit of parts of claim 23, wherein the post, the beam, the first panel and the second panel form a wall of a building.

**34.** The kit of parts of claim 23, wherein at least one of the post and the beam has a round cross-section.

**35.** The kit of parts of claim 23, when assembled, forming an assembly for use at a corner of a structure, wherein the post further comprises a second notch within the post and both the notch and the second notch in the post are defined along at least a portion of the length of the post and oriented substantially perpendicularly to each other; and the kit of parts further comprising:

a second beam configured to be positioned above and supported by the beam, the second beam comprising at least one notch defined within the second beam;

the notch in the second beam and the second notch in the post each comprising a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces in each of the notch in the second beam and the second notch in the post being tiered and comprising an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and

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immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a third panel comprises a side and a top side, the side of the third panel configured to be positioned within the second notch in the post and be facing at least the base surface and the inner portion of the tiered surface of the second notch in the post, and the top side of the third panel configured to be positioned within the notch in the second beam and be facing at least the base surface and the inner portion of the tiered surface of the notch in the second beam; and

a fourth panel comprising a side and a top side, the side of the fourth panel configured to be positioned within the second notch in the post, the fourth panel configured to be substantially parallel to the third panel, the side of the fourth panel configured to be facing at least the outer portion of the tiered surface of the second notch in the post, and the top side of the fourth panel configured to be positioned within the notch in the second beam and be facing at least the outer portion of the tiered surface of the notch in the second beam.

36. The kit of parts of claim 23, wherein the first panel comprises two boards and a polymer material located between the two boards.

37. The kit of parts of claim 36, wherein the two boards include at least one of oriented strand boards, magnesium oxide boards, hemp boards, vinyl boards, and drywall.

38. The kit of parts of claim 36, wherein the polymer material comprises at least one of polyurethane and polyisocyanurate.

39. The kit of parts of claim 23 further comprising at least one of adhesive, spray foam and rubber stripping, for used in affixing the first panel to at least one of the notch in the post and the notch in the beam.

40. A kit of parts for integrating an elongate structural member and a panel, the kit comprising:

an elongate structural member having at least one notch defined within the elongate structural member, the notch comprising a base surface and two side surfaces at opposite ends of the base surface, wherein at least one of the side surfaces is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a first panel is configured to be positioned within the notch and be facing at least the base surface and the inner portion of the tiered surface;

a second panel is configured to be positioned within the notch and substantially parallel to the first panel, so that the second panel is facing at least the outer portion of the tiered surface;

the notch is defined along at least a portion of the length of the elongate structural member;

the other side surface of the notch is not tiered;

the tiered side surface comprises multiple outer portions, and each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface;

the elongate structural member is any one of a post and a beam;

the elongate structural member has a round cross-section;

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the first panel comprises two boards and a polymer material located between the two boards; and  
the first panel is affixed to the notch with at least one of adhesive, spray foam and rubber, stripping.

41. A kit of parts for integrating a first post, a second post, a beam, a first panel and a second panel, the kit comprising a first post, a second post, a beam, a first panel and a second panel, wherein:

the beam is configured to be supported by the first post and the second post and positioned above and at an angle to the first post and the second post;

the first post comprises at least one notch defined within the first post;

the second post comprises at least one notch;

the beam comprises at least one notch;

the notch in the first post, the notch in the second post, and the notch in the beam each comprises a base surface and two side surfaces at opposite ends of the base surface, wherein at least one of the side surfaces in each of the notch in the first post, the notch in the second post and the notch in the beam is tiered and comprises an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

the first panel comprises a first side, a second side opposite to the first side of the first panel, and a top side adjacent and between the first side and the second side of the first panel;

the first side of the first panel is configured to be positioned within the notch in the first post and be facing at least the base surface and the inner portion of the tiered surface; the top side of the first panel is configured to be positioned within the notch in the beam and be facing at least the base surface and the inner portion of the tiered surface of the notch in the beam;

the second side of the first panel is configured to be positioned within the notch in the second post and be facing at least the base surface and the inner portion of the tiered surface of the notch in the second post;

the second panel comprises a first side, a second side opposite to the first side of the second panel, and a top side adjacent and between the first side and the second side of the second panel;

the first side of the second panel is configured to be positioned within the notch in the first post, the second panel is configured to be substantially parallel to the first panel, and the first side of the second panel is configured to be facing at least the outer portion of the tiered surface of the notch in the first post;

the top side of the second panel is configured to be positioned within the notch in the beam and be facing at least the outer portion of the tiered surface of the notch in the beam; and

the second side of the second panel is configured to be positioned within the notch in the second post and be facing at least the outer portion of the tiered surface of the notch in the second post.

42. A kit of parts for integrating an elongate structural member and a panel, the kit comprising:

an elongate structural member having at least one notch defined along the width of the elongate structural member, the notch comprising a base surface and two side surfaces at opposite ends of the base surface, wherein at least one of the side surfaces is tiered and comprises an

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inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicular and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a first panel is configured to be positioned within the notch and be facing at least the base surface and the inner portion of the tiered surface;

a second panel is configured to be positioned within the notch and substantially parallel to the first panel, the second panel configured to be facing at least the outer portion of the tiered surface;

wherein:

the tiered side surface comprises multiple outer portions, and in each outer portion that is positioned increasingly further away from the base surface is also positioned increasingly further away from the other side surface;

the elongate structural member is any one of a post and a beam;

the elongate structural member has a round cross-section; and

the first panel comprises two boards and a polymer material located between the two boards.

43. An assembly for use at a corner of a structure, the assembly comprising a post, a first beam, a second beam, a first panel, a second panel, a third panel and a fourth panel, the first beam configured to be supported by the post and positioned above and at an angle to the post, and the second beam configured to be positioned above and supported by the first beam, wherein:

the post comprising at least a first notch and a second notch, both the first notch and the second notch defined along the length of the post and oriented substantially perpendicularly to each other;

the first beam comprising at least one notch;

the second beam comprising at least one notch;

the first and the second notches in the post, the notch in the first beam and the notch in the second beam each comprising a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces in each of the notch in the post, the notch in the first beam and the notch in the second beam being tiered and comprising an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicularly and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a side of the first panel is positioned within the first notch in the post and is facing at least the base surface and the inner portion of the tiered surface of the first notch in the post;

a top side of the first panel is positioned within the notch in the first beam and is facing at least the base surface and the inner portion of the tiered surface of the notch in the first beam;

a side of the second panel is positioned within the first notch in the post, the second panel being substantially parallel to the first panel, and the side of the second panel is facing at least the outer portion of the tiered surface of the first notch in the post;

a top side of the second panel is positioned within the notch in the first beam and is facing at least the outer portion of the tiered surface of the notch in the first beam;

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a side of the third panel is positioned within the second notch in the post and is facing at least the base surface and the inner portion of the tiered surface of the second notch in the post;

a top side of the third panel is positioned within the notch in the second beam and is facing at least the base surface and the inner portion of the tiered surface of the notch in the second beam;

a side of the fourth panel is positioned within the second notch in the post, the fourth panel being substantially parallel to the third panel, and the side of the fourth panel is facing at least the outer portion of the tiered surface of the second notch in the post; and

a top side of the fourth panel is positioned within the notch in the second beam and is facing at least the outer portion of the tiered surface of the notch in the second beam.

44. A kit of parts for an assembly for use in a corner of a structure, the kit of parts comprising a post, a first beam, a second beam, a first panel, a second panel, a third panel and a fourth panel, the first beam configured to be supported by the post and positioned above and at an angle to the post, and the second beam configured to be positioned above and supported by the first beam, wherein:

the post comprising at least a first notch and a second notch, both the first notch and the second notch defined along at least a portion of the length of the post and oriented substantially perpendicularly to each other;

the first beam comprising at least one notch;

the second beam comprising at least one notch;

the first and the second notches in the post, the notch in the first beam and the notch in the second beam each comprising a base surface and two side surfaces at opposite ends of the base surface;

at least one of the side surfaces in each of the notch in the post, the notch in the first beam and the notch in the second beam being tiered and comprising an inner portion and an outer portion that are substantially parallel to each other, the inner portion being substantially perpendicularly and immediately adjacent to the base surface, and the outer portion being offset from the inner portion and positioned further away from the other side surface than the inner portion;

a side of the first panel is configured to be positioned within the first notch in the post and be facing at least the base surface and the inner portion of the tiered surface of the first notch in the post;

a top side of the first panel is configured to be positioned within the notch in the first beam and be facing at least the base surface and the inner portion of the tiered surface of the notch in the first beam;

a side of the second panel is configured to be positioned within the first notch in the post, the second panel configured to be substantially parallel to the first panel, and the side of the second panel configured to be facing at least the outer portion of the tiered surface of the first notch in the post;

a top side of the second panel is configured to be positioned within the notch in the first beam and be facing at least the outer portion of the tiered surface of the notch in the first beam;

a side of the third panel is configured to be positioned within the second notch in the post and be facing at least the base surface and the inner portion of the tiered surface of the second notch in the post;

a top side of the third panel is configured to be positioned within the notch in the second beam and be facing at

least the base surface and the inner portion of the tiered surface of the notch in the second beam;  
a side of the fourth panel is configured to be positioned within the second notch in the post, the fourth panel configured to be substantially parallel to the third panel, 5 and the side of the fourth panel configured to be facing at least the outer portion of the tiered surface of the second notch in the post; and  
a top side of the fourth panel is configured to be positioned within the notch in the second beam and be facing at 10 least the outer portion of the tiered surface of the notch in the second beam.

\* \* \* \* \*